Mathematics Standards Clarification for Grade 8

2019

The Nevada Ready! Network

Designed for teachers by teachers!


The
Nevada Ready!
Network
Standards-Based Instruction for
ALL Nevada Students


NMC
NEVADA
MATHEMATICS
COUNCIL


Southern Nevada
RP
DP


Nevada Department
of Education
Nevada Ready!

Table of Contents

Number Systems

Eighth grade students learn to distinguish between rational and irrational numbers. Building on seventh grade understanding, students recognize that the decimal equivalent of a fraction will either terminate or repeat and they convert repeating decimals into their fraction equivalents. Finally, eighth graders use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions (Miles and Williams, 2016).

Cluster

Know that there are numbers that are not rational, and approximate them by rational numbers.

NVACS 8.NS.A.1 (Major Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students are reasoning as they explain how to get more precise approximations. • MP 6 Students are using rational approximations for irrational numbers to compare and locate irrational numbers on a number line. • MP 8 Students explain how to get more precise rational approximations of irrational numbers. (Miles and Williams, 2016)
Instructional Strategies	• Defining the number sets, understanding subsets. • Create a Venn diagram for the real number system. • Being able to identify between an approximation and exact value. • Precise academic language e.g.: terminating vs. repeating. • Notation for repeating decimals and calculator display.
Prerequisite Skills	• Convert between fraction and decimals • Know equivalent fractions • Bring in prior knowledge of pi; π is an exact value and 3.14 is an approximation
Connections Within and Beyond Grade Level	• Find exact answers for radicals • Rational exponents
Instructional Examples/Lessons/ Tasks	• Really! I'm Rational! (CPALMS) • The Real Number System: (Alabama Learning Exchange) • Number Systems BLAST: (CCSD Blast Module)
Assessment Examples	• Assessment questions should include rational and irrational numbers where students have to decide if the number is rational or irrational and justify why with the mathematics and or explanation. • Identifying Rational Numbers: (Illustrative Mathematics) 8.NS.A.1 SBAC Sample Assessment Items

Number Systems

Cluster

Know that there are numbers that are not rational, and approximate them by rational numbers.

NVACS 8.NS.A.2 (Supporting Work)

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). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students are reasoning abstractly as they determine where to place rational and irrational numbers on the number line. • MP 6 Students are using rational approximations of irrational numbers to compare size and locate on a number line. • MP 8 Students explain how to get more precise rational approximations of irrational numbers. (Miles and Williams, 2016)
Instructional Strategies	• How precise an estimation should be when converting to a decimal. • Approximate a negative number and identify it on the number line. • Use place value to check for accuracy of estimations.
Prerequisite Skills	• Knowledge of square roots • Know how to place positive and negative numbers on a number line • Compare and order decimals
Connections Within and Beyond Grade Level	• Pythagorean Theorem • Area/circumference of circles • Links to complex numbers
Instructional Examples/Lessons/Tasks	• Estimating Square Roots with Square Tiles: • Number Systems BLAST: (CCSD Blast Module)
Assessment Examples	• Irrational Numbers on the Number Line (Illustrative Mathematics) • Comparing Rational and Irrational Numbers (Illustrative Mathematics) • Sample SBAC Assessment Item 8.NS.A.2 SBAC Sample Assessment Items

Expressions and Equations

Eighth grade students focus on more complex equations by learning about and applying the properties of integer exponents, square and cube roots, and scientific notation. They also connect previous understandings about proportional relationships to linear equations. Systems of two linear equations in two variables are introduced, and three methods for finding solutions are learned. (Miles and Williams, 2016).

Cluster

Work with radicals and integer exponents.

NVACS 8.EE.A.1 (Major Work)

Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to express how many times larger (or smaller) one number is than another when both are expressed in scientific notation. • MP 5 Students learn to read scientific notation as expressed by technology. • MP 6 Students compute with integer exponents and numbers in scientific notation accurately. (Miles and Williams, 2016)
Instructional Strategies	• Use expanded form to see repeated multiplication and division patterns to develop the rules of exponents. • Start with base 10.
Prerequisite Skills	• Understand powers of 10. • Know repeated multiplication. • Know: base, exponent, reciprocal, factors. • Know how to apply a power to the base.
Connections Within and Beyond Grade Level	Useful when working with: • Imaginary numbers • Pythagorean Theorem • Exponential and quadratic expressions • Logarithms • Changing bases when working with exponential equations • Rational and radical functions.
Instructional Examples/Lessons/Tasks	• Discovering Rules of Exponents • Unit Lessons (Eureka-need free account) • Expressions and Equations BLAST (CCSD Blast module)

Element	Exemplars
Assessment Examples	• Multiple select questions where students need to choose all models that apply to the question 8.EE.A.1 SBAC Sample Items • Identify the missing exponent 8.EE.A.1 SBAC Sample Items • Illustrate Understanding of Exponents (Achieve the Core)

Expressions and Equations

Cluster

Work with radicals and integer exponents.

NVACS 8.EE.A.2 (Major Work)

Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to express how many times larger (or smaller) one number is than another when both are expressed in scientific notation. • MP 5 Students learn to read scientific notation as expressed by technology. • MP 6 Students compute with integer exponents and numbers in scientific notation accurately. (Miles and Williams, 2016)
Instructional Strategies	• Expand the root to help find the solutions. • Connect to prior knowledge of integer operations. • Explicitly teach perfect square and perfect cubes and square and cube roots. • Know characteristics of rational and irrational numbers. • Knowing when to use appropriate tools (calculator vs. number line) when working with irrational numbers. • Understand that when solving square root equations, the solutions are + and – but when solving cube root equations, the solution is + or – .
Prerequisite Skills	• Area of squares • Volume of cubes
Connections Within and Beyond Grade Level	• Solving quadratic and cubic equations • Simplify rational expressions • Rationalizing denominators
Instructional Examples/Lessons/Tasks	• Unit Lessons (Eureka-need free account) • Expressions and Equations BLAST (CCSD Blast Module)
Assessment Examples	• Sample SBAC Assessment Item 8.EE.A.2 SBAC Sample Assessment Items

Expressions and Equations

Cluster

Work with radicals and integer exponents.

NVACS 8.EE.A.3 (Major Work)

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. *For example, estimate the population of the United States as 3 x 10^8 and the population of the world as 7 x 10^9, and determine that the world population is more than 20 times larger.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to express how many times larger (or smaller) one number is than another when both are expressed in scientific notation. • MP 5 Students learn to read scientific notation as expressed by technology. • MP 6 Students compute with integer exponents and numbers in scientific notation accurately. (Miles and Williams, 2016)
Instructional Strategies	• Coordinate with Science department to see how it is taught (vocabulary, types of problems, etc.). Why is it useful? • Discovering scientific notation is a more efficient way to compare numbers. • Use the properties of exponents to multiply or divide numbers written in scientific notation.
Prerequisite Skills	• Place value • Powers of 10 • Properties of exponents
Connections Within and Beyond Grade Level	• Exponential growth and decay • Simple and compound interest
Instructional Examples/Lessons/ Tasks	• Use Multiplication to Compare Numbers Written in Scientific Notation (Learn Zillion) • Determine the value of a missing exponent in an equation • Scientific Notation Classroom Activity (Math Shorts) • Expressions and Equations BLAST (CCSD Blast module)
Assessment Examples	• Sample SBAC Assessment Item (SBAC Digital Library)

Expressions and Equations

Cluster

Work with radicals and integer exponents.

NVACS 8.EE.A.4 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students use reasoning to express how many times larger (or smaller) one number is than another when both are expressed in scientific notation. • MP 5 Students learn to read scientific notation as expressed by technology. • MP 6 Students compute with integer exponents and numbers in scientific notation accurately. (Miles and Williams, 2016)
Instructional Strategies	• Use appropriate tools (calculator) and know what the display represents. • Use integer operations to simplify scientific notation expressions. • Use the properties of exponents to multiply or divide numbers written in scientific notation.
Prerequisite Skills	• Knowledge of scientific notation • Properties of integer exponents to solve problems • Like terms • Commutative Property • Greatest Common Factor
Connections Within and Beyond Grade Level	• Principle and interest • Factoring expressions • Geometric sequences • Exponential growth and decay word problems
Instructional Examples/Lessons/Tasks	• Expressions and Equations BLAST (CCSD Blast module) • Ant and Elephant (Illustrative Math)
Assessment Examples	• End of Module Assessment Task (Louisiana Believes) • Exponents (SCUSD) • Sample SBAC Assessment Item 8.EE.A.4 Various Sample Assessment Items 8.EE.A.4 SBAC Sample Assessment Items

Expressions and Equations

Cluster

Understand the connections between proportional relationships, lines, and linear equations.

NVACS 8.EE.B.5 (Major Work)

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students compare two proportional relationships represented in different forms. • MP 6 Students give explanations that are precise and use appropriate vocabulary. • MP 7 Students see a pattern that results in the general form of a linear equation. (Miles and Williams, 2016)
Instructional Strategies	• Provide students with different forms (graphs, tables, equations, verbal descriptions) that are mixed up. Students match the forms. (Miles and Williams, 2016) • Have students interpret the meaning of slope in the context of the real word situation it represents. For example, if the slope is 4/5 on a distance (feet) vs time (seconds) graph, this means you can travel 4 feet in 5 seconds, or .8 feet in 1 second. This also relates back to unit rate. • 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.
Prerequisite Skills	• Recognize, solve, and represent proportional relationships • Understand unit rate
Connections Within and Beyond Grade Level	• Solve multi-step, real-life, and mathematical problems posed with real numbers • Recognize, solve, and represent proportional relationships • Interpret and analyze functions • Rate of change • Derivatives
Instructional Examples/Lessons/Tasks	• Slippery Slope (SBAC Digital Library) • Who Has the Best Job? (Illustrative Mathematics) • Sore Throats, Variation 2 (Illustrative Mathematics)
Assessment Examples	• Sample SBAC Assessment Item 8.EE.B.5 SBAC Sample Assessment Items

Expressions and Equations

Cluster

Work with radicals and integer exponents.

NVACS 8.EE.B.6 (Major Work)

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*.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students compare two proportional relationships represented in different forms. • MP 6 Students give explanations that are precise and use appropriate vocabulary. • MP 7 Students see a pattern that results in the general form of a linear equation. (Miles and Williams, 2016)
Instructional Strategies	• Use Desmos to have the students discover that b is the y-intercept and that m is the slope in the general equation for a line, y = mx + b. • Give students one graph, table, or linear equation and ask students to provide the others to match the given.
Prerequisite Skills	• Knowledge of similar figures • Recognize, solve, and represent proportional relationships • Graph proportional relationships
Connections Within and Beyond Grade Level	• Solve multi-step, real-life, and mathematical problems posed with real numbers • Recognize, solve, and represent proportional relationships • Interpret and analyze functions • Rate of change • Linear functions and nonlinear functions • Initial value/y-intercept
Instructional Examples/Lessons/Tasks	• Lines, Slopes, Linear Equations (SBAC Digital Library) • Slopes Between Points on a Line (Illustrative Mathematics)
Assessment Examples	• Sample SBAC Assessment Item 8.EE.B.6 SBAC Sample Assessment Items

Expressions and Equations

Cluster

Analyze and solve linear equations and pairs of simultaneous linear equations.

NVACS 8.EE.C.7 (Major Work)

Solve linear equations in one variable.

- **8.EE.C.7.a**
  Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, *or* $a = b$ results (where a and b are different numbers).
- **8.EE.C.7.b**
  Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems with systems of linear equations. • MP 2 Students analyze linear equations and systems of linear equations. • MP 4 Students model real-world problems with systems of equations. (Miles and Williams, 2016)
Instructional Strategies	• Utilize standardized test vocabulary to familiarize students with test format. • Students analyze and critique equations that are student generated.
Prerequisite Skills	• Distributive Property • Combine like terms • Substitution • Integer operations • Solve one and two-step equations
Connections Within and Beyond Grade Level	• Solve a system by locating the point of intersection of the lines
Instructional Examples/Lessons/ Tasks	• Expressions and Equations Domain (Illustrative Mathematics) • Solving Linear Equations in One Variable (MARS) • Create scavenger hunts for students to compete
Assessment Examples	• Sample SBAC Assessment Item 8.EE.C.7 SBAC Sample Assessment Items

Expressions and Equations

Cluster

Analyze and solve linear equations and pairs of simultaneous linear equations.

NVACS 8.EE.C.8 (Major Work)

Analyze and solve pairs of simultaneous linear equations.

- **8.EE.C.8.a**
  Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- **8.EE.C.8.b**
  Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*
- **8.EE.C.8.c**
  Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems with systems of linear equations. • MP 2 Students analyze linear equations and systems of linear equations. • MP 4 Students model real-world problems with systems of equations. (Miles and Williams, 2016)
Instructional Strategies	• Use graphing tools will allow students to discover why the solution to a system of equations is the point of intersection. • Allow students to see what one solution, no solution and infinitely many solutions look like when graphed. • Utilize standardized test vocabulary to familiarize students with test format. • Students analyze, and critique equations that are student generated.
Prerequisite Skills	• Graph linear equations • Solve equations • Graph ordered pairs • Slope-Intercept Form • Substitution

Connections Within and Beyond Grade Level	• Understand that solving systems of two linear equations can be extended to systems of three or more linear equations, as well as nonlinear systems, e.g., linear and exponential, linear and quadratic. • Concepts used here will also be applied to systems of inequalities and linear programming. • Use Desmos, or other graphing tool, to graph a line for each expression on both sides of the equation. Then, find the intersection of those lines. The x-coordinate of the intersection point is the solution of the one variable equation.
Instructional Examples/Lessons/ Tasks	• Buying Chips and Candy (MARS) • Expressions and Equations Domain (Illustrative Mathematics) • Linear Systems- Gym Membership (Desmos) • Classifying Solutions to Systems of Equations (Mathshell.org)
Assessment Examples	• Sample SBAC Assessment Item 8.EE.C.8 SBAC Sample Assessment Item

Functions

Eighth grade students work with expressions and equations, including modeling an association in bivariate data with a linear equation, solving systems of equations with three different methods. Students learn about and use functions to describe quantitative relationships (Miles and Williams, 2016).

Cluster

Define, evaluate, and compare functions.

NVACS 8.F.A.1 (Major Work)

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.[1]

[1] Function notation is not required for Grade 8.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students determine if a relationship is a function. • MP 4 Students represent linear functions in algebraic, graphical, numerical, and verbal forms. • MP 5 Students use technological tools to explore and deepen their understanding of functions. • MP 7 Students apply general mathematical rules such as $y = mx + b$ as the equation for a linear function. • (Miles and Williams, 2016)
Instructional Strategies	• Provide graphs of relationships, some of which are functions and some not. (Do not limit examples to linear relationships.) • Each graph should have a context so that students can reason whether or not the graph makes sense. • Model use of the vocabulary terms function, input, and output. • Present students with tables of relationships, some of which are functions and some are not. • Encourage students to reason whether the example is a function or not and justify their conclusion. • (Miles and Williams, 2016)
Prerequisite Skills	• Describe patterns and relationships between quantities • Recognize and represent proportional relationships between quantities • Use variables to represent quantities, construct simple equations and inequalities to solve problems via reasoning
Connections Within and Beyond Grade Level	• Begin to use formal notation and language for functions • Graph functions expressed symbolically and show key features of graph
Instructional Examples/Lessons/ Tasks	• Functions (Illuminations) • Grade 8 Unit Resources-Unit 4 (SNRPDP) • Card Sort (Desmos) • Party Zone Palace (SBAC Digital Library) • Function Machine (SBAC Digital Library)

Element	Exemplars
Assessment Examples	• Sample SBAC Assessment Item 8.F.A.1 SBAC Sample Assessment Items 8.F.A.1 Various Sample Assessment Items

Functions

Cluster

Define, evaluate, and compare functions.

NVACS 8.F.A.2 (Major Work)

Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students determine if a relationship is a function. • MP 4 Students represent linear functions in algebraic, graphical, numerical, and verbal forms. • MP 5 Students use technological tools to explore and deepen their understanding of functions. • MP 7 Students apply general mathematical rules such as $y = mx + b$ as the equation for a linear function. (Miles and Williams, 2016)
Instructional Strategies	• Present two different linear functions using the same representation (algebraically, graphically, in a table, or by a verbal description). • Ask the students if they can explain which has the greater slope (rate of change). Present two functions each represented in a different form and ask the students to work in groups to determine which has the greater slope. Facilitate the discussion with questions such as, "How did you determine which slope is greater? Why did you select to represent the functions in a different form?" Present two different functions in similar context so that the question about comparing the slopes has meaning. (Miles and Williams, 2016)
Prerequisite Skills	• Recognize and represent proportional relationships between quantities • Use variables to represent quantities • Construct simple equations and inequalities to solve problems via reasoning
Connections Within and Beyond Grade Level	• Compare properties of two functions each represented in a different way
Instructional Examples/Lessons/Tasks	• Grade 8 Unit Resources-Unit 5 (SNRPDP) • Performance Task (SBAC Digital Library) • Linear Functions and Nonlinear Thinking (SBAC Digital Library) • Linear Function Cluster (SBAC Digital Library)
Assessment Examples	• Sample SBAC Assessment Item 8.F.A.2 SBAC Sample Assessment Items 8.F.A.2 Various Sample Assessment Items

Functions

Cluster

Define, evaluate, and compare functions.

NVACS 8.F.A.3 (Major Work)

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. For example, the function $A = S^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Element	Exemplars
Standards for Mathematical Practice	• MP 2 Students determine if a relationship is a function. • MP 4 Students represent linear functions in algebraic, graphical, numerical, and verbal forms. • MP 5 Students use technological tools to explore and deepen their understanding of functions. • MP 7 Students apply general mathematical rules such as $y = mx + b$ as the equation for a linear function. (Miles and Williams, 2016)
Instructional Strategies	• Present students with examples of functions that are linear and nonlinear for them to graph. Facilitate a class discussion about the similarities and differences in the graphs. • Present a series of linear equations. Ask students to find the similarities and differences among the equations and their graphs. • Facilitate a discussion that results in students recognizing the structure and naming y = mx + b as the general equation for a linear function. • Point out that when using a graphing calculator, the general equation for a line is usually expressed as y = ax + b. • Ask students to write examples of linear functions. This may be a group challenge allowing groups to present their work to the class using correct terminology. • Some students have difficulty with the general equation y = mx + b for equations presented as subtraction such as y = 5x – 4. Students can be asked to graph a series of such equations to convince themselves that they are linear. In addition, point out that "minus four" is the same thing as "adding negative four." (Miles and Williams, 2016)
Prerequisite Skills	• Plot points on a coordinate plane • Know the difference between linear and nonlinear
Connections Within and Beyond Grade Level	• Represent and solve equations and inequalities graphically • Write expressions in equivalent forms to solve problems • Build new functions from existing functions • Analyze functions using different representations

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Grade 8 Unit Resources-Unit 6 (SNRPDP) • Matching Cards-Five Representations (SBAC Digital Library) • Piggy Bank Problem (SBAC Digital Library) • Domino Effect Problem (Mathalicous)
Assessment Examples	• Sample Assessment Item 8.F.A.3 Assessment Examples (Various sources)

Functions

Cluster

Use functions to model relationships between quantities.

NVACS 8.F.B.4 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students construct a function to model a linear relationship between two quantities. • MP 7 Students make use of the qualitative features (structure) found in a verbal description of a function and sketch that function. (Miles and Williams, 2016)

Element	Exemplars
Instructional Strategies	• Present students with graphs of linear functions and focus a discussion on the y-intercept. • From examples, lead students to discover that they y-intercept is the y-value when the x-value is zero. • Provide students with opportunities to identify the y-intercept on several graphs. • Pose the following challenge: Show a table for each of the graphs presented and identify the y-intercept in the table. • Ask students to find the equations for the linear functions presented and see if they can figure out how to find the y-intercept when the function is in equation form. (It is the constant in the equation y = mx+b.) Present some equations where the format is y = b + mx and where the y-intercept is negative. • Provide context as much as possible so that students learn to interpret the meaning of the initial value in a function. • Explain slope of a line by presenting a graph of a linear equation and introducing the slope as the ratio of the change in the y-values of two points to change in the x-value of the same two points. • Display tables for students to use to determine rate of change using the rise to run ratio. • Provide students the opportunity to discover that the coefficient of x in the equation y = mx + b is the slope by allowing them to look at the tables, calculate slope, and compare to the equations of the lines. • Provide context as much as possible so that students can interpret the meaning of the slope in a given situation. • Provide students verbal descriptions of situations where they can create the equation of the function. (Miles and Williams, 2016)
Prerequisite Skills	• Recognize and represent proportional relationships between quantities • Use variables to represent quantities • Construct simple equations and inequalities to solve problems via reasoning
Connections Within and Beyond Grade Level	• Create equations that describe numbers or relationships • Interpret the structure of expressions
Instructional Examples/Lessons/Tasks	• Grade 8 Unit Resources-Unit 6 (SNRPDP) • Summer Jobs (SBAC Digital Library) • Dan's Leaking Bottle (SBAC Digital Library) • Interpreting Distance-Time Graphs (MARS) • Slippery Slope (SBAC Digital Library)
Assessment Examples	• Sample SBAC Assessment Item 8.F.B.4 Various Sample Assessment Items 8.F.B.4 SBAC Sample Assessment Items

Functions

Cluster

Use functions to model relationships between quantities.

NVACS 8.F.B.5 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students construct a function to model a linear relationship between two quantities. • MP 7 Students make use of the qualitative features (structure) found in a verbal description of a function and sketch that function. (Miles and Williams, 2016)
Instructional Strategies	• Challenge students with a graph and situation that has Time on the x-axis and Height of a Plane on the y-axis and models the following situation: A plane travels from a West Coast airport to Denver. Take off is fine and the plane cruises. Then the pilot is warned of bad weather ahead, so he climbs above the clouds. Travel continues until it is time to land. Ask students to match the parts of the story to the parts of the graph. Use this example (or a similar one) to help students learn that graphs can tell stories. • Model the use of mathematical vocabulary to describe the parts of the graph that are linear, increasing, decreasing, and so on. • Present students with a graph and ask them to tell/write the story and label the axes. A classic example is to write a story about the height of water in a bathtub over time to match a graph similar to the one used in the airplane story. • Provide students with opportunities to sketch graphs given the stories. Select stories where the graph may appear counterintuitive such as the graph of a plane's distance from its destination city to its time in the air. This graph has a negative slope since as the time increases, the distance to the destination city decreases. • A common error students make is that they do not read the labels on the axes carefully. Eighth graders who sketch graphs that appear counterintuitive from the story are making assumptions about the axes without analyzing them. These students should be asked to describe what the axes mean on a graph before they begin to analyze or write a story. (Miles and Williams, 2016)
Prerequisite Skills	• Understand that a function is a rule • Graph linear equations • Rate of change • Initial value/y-intercept

Element	Exemplars
Connections Within and Beyond Grade Level	• Interpret functions that arise in applications in terms of the context • Construct and compare linear, quadratic, and exponential models and solve problems
Instructional Examples/Lessons/ Tasks	• Grade 8 Unit Resources-Unit 6 (SNRPDP) • Graphing Stories (SBAC Digital Library) • Function Carnival (Desmos) • Function Carnival Part 2 (Desmos)
Assessment Examples	• Sample SBAC Assessment Item 8.F.B.5 Various Sample Assessment Items 8.F.B.5 SBAC Sample Assessment Items

Geometry

The geometry focus in Grade 8 is on transformations. At this level, students describe their effects on figures in the coordinate plane to use the ideas they have developed about distance and angles. Students investigate angles created when a transversal crosses parallel lines and investigate the angle-angle criterion for similarity of triangles. Students understand the Pythagorean Theorem and its converse and use it to find distances on the coordinate plane. The study of volume culminates with problem solving for volume for cones, spheres, and cylinders (Miles and Williams, 2016).

Cluster

Understand congruence and similarity using physical models, transparencies, or geometry software.

NVACS 8.G.A.1 (Major Supporting Work)

Verify experimentally the properties of rotations, reflections, and translations.

- **8.G.A.1.a**
  Lines are taken to lines, and line segments to line segments of the same length.
- **8.G.A.1.b**
  Angles are taken to angles of the same measure.
- **8.G.A.1.c**
  Parallel lines are taken to parallel lines.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students model on the coordinate plane to explore congruent and similar figures. • MP 6 Students are careful to bring lines to lines and angles to appropriate angles in transformations. • MP 7 Students attend to the structure of the figures as they transform them. (Miles and Williams, 2016)
Instructional Strategies	• Understand terminology of rotation, reflection, translations and what they do • Understand corresponding parts, preimage and image, and prime notation • Use patty paper or tracing paper to manipulate figures. • Use grid paper with no numbers for rotation
Prerequisite Skills	• Work on a coordinate grid (quadrants, axes, etc.) • Know the direction of clockwise and counterclockwise • Angle notation
Connections Within and Beyond Grade Level	• Proofs and notation • Isometries and mapping • Orientation and properties of congruence
Instructional Examples/Lessons/ Tasks	• Transform Through the Maze (CPALMS) • A Transformation's Adventure with Patty Paper (CPALMS) • Game Design (SBAC Digital Library)

Element	Exemplars
Assessment Examples	• Transformations of line segments example PARCC item (Achieve the Core) • Sample SBAC Assessment Item (SBAC Digital Library) 8.G.A.1 SBAC Sample Assessment Items

Geometry

Cluster

Understand congruence and similarity using physical models, transparencies, or geometry software.

NVACS 8.G.A.2 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP4 Students model on the coordinate plane to explore congruent and similar figures. • MP 6 Students are careful to bring lines to lines and angles to appropriate angles in transformations. • MP 7 Students attend to the structure of the figures as they transform them. (Miles and Williams, 2016)
Instructional Strategies	• Teach the symbol for congruence and what congruency means. • Steps of transformation done through writing (informal proofs). • Given two congruent figures, determine the transformation(s) needed to get there. • Perform error analysis on a series of transformations. • Determine if it is possible to use fewer than the given number of transformations.
Prerequisite Skills	• Transformations • Equivalence
Connections Within and Beyond Grade Level	• Proofs and notation • Isometries and mapping • Composition of transformations • Orientation and properties of congruence
Instructional Examples/Lessons/ Tasks	• Triangle Congruence • (NCTM-must be a member) • Proving Congruence of Rectangles Task (Illustrative Mathematics) • Congruent Rectangles (Illustrative Mathematics) • Exploring Rigid Motion (SBAC Digital Library) • Game Design (SBAC Digital Library)
Assessment Examples	• ARC Assessment (NCTM-must be a member) • Triangle Congruence with Coordinates (Illustrative Mathematics) • Sample SBAC Assessment Item (Achieve the Core) 8.G.A.2 SBAC Sample Assessment Items

Geometry

Cluster

Understand congruence and similarity using physical models, transparencies, or geometry software.

NVACS 8.G.A.3 (Major Work)

Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students model on the coordinate plane to explore congruent and similar figures. • MP 6 Students are careful to bring lines to lines and angles to appropriate angles in transformations. • MP 7 Students attend to the structure of the figures as they transform them (Miles and Williams, 2016)
Instructional Strategies	• Establish rules by using patty paper or tracing paper. • Bring in five and six sided figures. • Incorporate technology (Desmos, geometer's sketchpad, Geogebra).
Prerequisite Skills	• Proportions and ratios for dilations • Work on coordinate grid (quadrants, axes, etc.) • Congruence versus similarities
Connections Within and Beyond Grade Level	• Inverse functions
Instructional Examples/Lessons/ Tasks	• Exploring Rigid Motion (SBAC Digital Library) • Game Design (SBAC Digital Library)
Assessment Examples	• Effects of Dilations (Illustrative Mathematics) • Sample SBAC Assessment Item 8.G.A.3 SBAC Sample Assessment Items

Geometry

Cluster

Understand congruence and similarity using physical models, transparencies, or geometry software.

NVACS 8.G.A.4 (Major Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 4 Students model on the coordinate plane to explore congruent and similar figures. • MP 6 Students are careful to bring lines to lines and angles to appropriate angles in transformations. • MP 7 Students attend to the structure of the figures as they transform them. • (Miles and Williams, 2016)
Instructional Strategies	• Establish the definition of similar. • Need to come up with the most efficient transformation to get from one figure to the next (viable arguments). • Communicate in writing.
Prerequisite Skills	• Scale factor • Ratios and proportions • Naming angles • Slope • Work on coordinate grid (quadrants, axes, etc.)
Connections Within and Beyond Grade Level	• Trigonometric ratios • Special right triangles
Instructional Examples/Lessons/ Tasks	• Exploring Rigid Motion (SBAC Digital Library) • Effects of Dilations (Illustrative Math Task)
Assessment Examples	• PARCC Item (Achieve the Core)

Geometry

Cluster

Understand congruence and similarity using physical models, transparencies, or geometry software.

NVACS 8.G.A.5 (Major Work)

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. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

Element	Exemplars
Standards for Mathematical Practice	• MP 3 Students use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. • MP 4 Students model on the coordinate plane to explore congruent and similar figures. • MP 6 Students are careful to bring lines to lines and angles to appropriate angles in transformations. • MP 7 Students attend to the structure of the figures as they transform them. (Miles and Williams, 2016)
Instructional Strategies	• Establish angle relationships through transformations. • Use proper academic vocabulary (adjacent, vertical, complementary, supplementary, etc.). • Informal proofs and basic formal proofs of angle relationships.
Prerequisite Skills	• Transformations • Solving equations with variables on both sides • Define and notate parallel lines
Connections Within and Beyond Grade Level	• Triangle proofs in geometry • Properties of parallelograms
Instructional Examples/Lessons/ Tasks	• Parallel Lines Performance Task (Radford.edu) • A Triangle's Interior Angles (Illustrative Math Task) • Special Angle Pairs Discovery (CPALMS) • Tile Patterns (Illustrative Math Task) • Rigid Motions and Congruent Angles (Illustrative Math Task)

Element	Exemplars
Assessment Examples	• Find the Missing Angle (Illustrative Math) • Find the Angle (Illustrative Math)

Geometry

Cluster

Understand and apply the Pythagorean Theorem.

NVACS 8.G.B.6 (Major Work)

Explain a proof of the Pythagorean Theorem and its converse.

Element	Exemplars
Standards for Mathematical Practice	• MP 3 Students model an informal proof to understand the Pythagorean Theorem. • MP 4 Students use modeling to understand the meaning of the Pythagorean Theorem. • MP 6 Students check their results to all computations. • MP 7 Students look for patterns in right triangles to help solve problems. (Miles and Williams, 2016)
Instructional Strategies	• Proof Using Squares (Math Giraffe)
Prerequisite Skills	• Evaluate square roots and cube roots • Solve real-world and mathematical problems involving area
Connections Within and Beyond Grade Level	• Use facts about angles • Solve real-world problems involving area • Prove theorems about lines, angles, and triangles • Use Pythagorean Theorem to solve right triangles in applied problems • Distance formula
Instructional Examples/Lessons/Tasks	• Converse of the Pythagorean Theorem: (Illustrative Mathematics)
Assessment Examples	• Sample Assessment Item 8.G.B.6 Various Sample Assessment Items

Geometry

Cluster

Understand and apply the Pythagorean Theorem.

NVACS 8.G.B.7 (Major Work)

Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

Element	Exemplars
Standards for Mathematical Practice	• MP 3 Students model an informal proof to understand the Pythagorean Theorem. • MP 4 Students use modeling to understand the meaning of the Pythagorean Theorem. • MP 6 Students check their results to all computations. • MP 7 Students look for patterns in right triangles to help solve problems. (Miles and Williams, 2016)
Instructional Strategies	• Exploring Length with Geoboards: (Desmos) • Pythagorean Theorem Games: (Onlinemathlearning.com)
Prerequisite Skills	• Evaluate square roots and cube roots • Knowledge of square numbers • Estimate irrational numbers
Connections Within and Beyond Grade Level	• Use Pythagorean Theorem to solve right triangles in applied problems • Distance formula
Instructional Examples/Lessons/ Tasks	• Glasses (Illustrative Mathematics) • Two Triangles' Area (Illustrative Mathematics) • The Pythagorean Theorem (SBAC Digital Library)
Assessment Examples	• Sample SBAC Assessment Item 8.G.B.7 SBAC Sample Assessment Items

Geometry

Cluster

Understand and apply the Pythagorean Theorem.

NVACS 8.G.B.8 (Major Work)

Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Element	Exemplars
Standards for Mathematical Practice	• MP 3 Students model an informal proof to understand the Pythagorean Theorem. • MP 4 Students use modeling to understand the meaning of the Pythagorean Theorem. • MP 6 Students check their results to all computations. • MP 7 Students look for patterns in right triangles to help solve problems. (Miles and Williams, 2016)
Instructional Strategies	• Exploring Length with Geoboards (Desmos)
Prerequisite Skills	• Evaluate square roots and cube roots. • Knowledge of square numbers • Estimate irrational numbers
Connections Within and Beyond Grade Level	• Use Pythagorean Theorem to solve right triangles in applied problems • Distance formula
Instructional Examples/Lessons/ Tasks	• Finding the Distance Between Two Points on the Coordinate Plane (SBAC Digital Library) • Finding the Distance (Illustrative Mathematics)
Assessment Examples	• Sample SBAC Assessment Item 8.G.B.8 SBAC Sample Assessment Items

Geometry

Cluster

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

NVACS 8.G.C.9 (Additional Work)

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems involving volume of cones, cylinders, and spheres. • MP 4 Students use modeling to understand the meaning of the Pythagorean Theorem. • MP 6 Students check their results to all computations. • MP 7 Students look for patterns in right triangles to help solve problems. (Miles and Williams, 2016)

Element	Exemplars
Instructional Strategies	• Prepare students to discover the formulas through hands-on experiences • For the volume of a cylinder, compare it to what students already know about the volume for a right rectangular prism • Using the knowledge that the volume of a right rectangular prism is the area of the base times the height, compare a cylinder to a prism of the same height. • Have physical models on hand. • Note that the base of the prism is a rectangle, and the base of the cylinder is a circle. • Lead students to reason that the formula for the volume is the same as the volume of a right rectangular prism in that both are the area of the base times the height. • So for the cylinder it is V = hπr2 which is the base area (πr2) times the height (h) • Compare the volume of a cylinder to a cone to derive the formula for the volume for a cone • Use a cylinder and cone of equal heights. Let students fill the cone with rice or water and ask students to estimate how many times they need to fill the cone in order to fill the cylinder. Students will conclude that the cone holds 1/3 the volume of the cylinder of the same height, thus the formula $V = 1/3h\pi r^2$. • Compare the volume of a sphere to the volume of a cylinder of the same height ○ Model half a sphere (hemisphere) placed inside the cylinder of the same height and base. The area of the base of the cylinder and the area of the section created by cutting the sphere in half are both πr^2. In this model, the height of the cylinder is also r, so the volume of the cylinder is πr^3. Fill the hemisphere with rice or water and estimate how many will fill the cylinder. The volume of the hemisphere with radius r is $\frac{2}{3}$that of the cylinder. Since the hemisphere is only half of the sphere, we double and find $V = 4/3h\pi r^3$. • Prepare a variety of problems and settings for students to solve real-world and mathematical problems by applying the volume formulas for cones, cylinders, and spheres. • Students may confuse the three formulas if they are asked to memorize them without any understanding of why they make sense. It is important to spend time on the derivations and have students physically take part and make the discoveries for themselves. (Miles and Williams, 2016)
Prerequisite Skills	• Solve real-world and problems involving angle measure, area, surface area, and volume • Solve real-world and problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles,

Element	Exemplars
	quadrilaterals, polygons, cubes, and right prisms
Connections Within and Beyond Grade Level	• Pythagorean Theorem • Right triangles • Area of triangles, circles, and rectangles
Instructional Examples/Lessons/Tasks	• Grade 8 Unit Resources-Unit 14 (SNRPDP) • Task Glasses (Illustrative Mathematics)
Assessment Examples	• Sample SBAC Assessment Item 8.G.C.9 SBAC Sample Assessment Items

Statistics and Probability

The study of statistics in eighth grade focuses on constructing and interpreting scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Students describe these patterns as clusters, outliers, positive or negative association. Eighth graders learn that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table (Miles and Williams, 2016).

Cluster

Investigate patterns of association in bivariate data.

NVACS 8.SP.A.1 (Major Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems using a linear model in the context of bivariate data. • MP 2 Students informally assess a line of best fit to data. • MP 4 Students use a linear model to solve problems. • MP 6 Students solve problems efficiently, accurately, and with the degree of precision appropriate for the contest of the problem. (Miles and Williams, 2016)
Instructional Strategies	• Use student generated data to create scatter plots (eg: height and shoe size, hours spent on social media and hours spent watching TV). • Think-Pair-Share: Have students identify clustering, outliers and correlations. • Present examples and non-examples of linear associations/correlations. • Introduce vocabulary through the use of note-taking, oral recitation, and kinesthetic. • Use digital tools to create scatterplots.
Prerequisite Skills	• Coordinate plane • Linear graphs • Slope
Connections Within and Beyond Grade Level	• Students will relate the concept of slope to that of association when analyzing scatterplots. • In high school, students will learn to more formally analyze bivariate data (causation vs correlation) through the use of equations. • Fitting functions to data. • Plotting and analyzing residuals.

Element	Exemplars
Instructional Examples/Lessons/Tasks	• Illustrative Mathematics (Illustrative Mathematics) • Desmos (Desmos) • Math is Fun (Math Is Fun) • Sample SBAC Assessment Item • (SBAC Digital Library)
Assessment Examples	• Sample SBAC Assessment Item • 8.SP.A.1 SBAC Sample Assessment Items

Statistics and Probability

Cluster

Investigate patterns of association in bivariate data.

NVACS 8.SP.A.2 (Supporting Work)

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.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems using a linear model in the context of bivariate data. • MP 2 Students informally assess a line of best fit to data. • MP 4 Students use a linear model to solve problems. • MP 6 Students solve problems efficiently, accurately, and with the degree of precision appropriate for the contest of the problem. (Miles and Williams, 2016)
Instructional Mathematical Practice	• Use previously created, or new, student generated data to draw a line of best fit. • Use physical models, i.e., spaghetti or pipe cleaners to place a line of best fit onto a set of data. • Have students create a human scatter plot and determine associations and line of best fit. • Post examples of appropriate versus inappropriate lines of best fit. • Use digital tools to place an appropriate line of best fit.
Prerequisite Skills	• Coordinate plane • Linear graphs • Slope
Connections Within and Beyond Grade Level	• Relate to real world models of linear functions. • In Algebra, students will extend this to linear regression and residual plots. • Interpret the slope and the intercept of a linear model in the context of the data. • Computer and interpret the correlation coefficient of a linear fit.
Instructional Examples/Lessons/ Tasks	• Illustrative Mathematics (Illustrative Mathematics) • Math is Fun (Math Is Fun) • Math Bits (Math Bits) • Sample SBAC Assessment Item (SBAC Digital Library)

Element	Exemplars
Assessment Examples	• Sample SBAC Assessment Item 8.SP.A.2 SBAC Sample Assessment Items

Statistics and Probability

Cluster

Investigate patterns of association in bivariate data.

NVACS 8.SP.A.3 (Supporting Work)

Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems using a linear model in the context of bivariate data. • MP 2 Students informally assess a line of best fit to data. • MP 4 Students use a linear model to solve problems. • MP 6 Students solve problems efficiently, accurately, and with the degree of precision appropriate for the contest of the problem. (Miles and Williams, 2016)
Instructional Strategies	• Think-Pair-Share: Students can analyze scatter plots, then share whole group • Note-taking: Summarization of concepts learned • Use of digital tools
Prerequisite Skills	• Coordinate plane • Linear graphs • Linear equations in two variables • Slope-intercept form of linear equation • Rate of change/slope and y-intercept
Connections Within and Beyond Grade Level	• Interpret slope-intercept form for real world models • In Algebra, students will use the equation of the line of best fit to make predictions through interpolation and extrapolation
Instructional Examples/Lessons/ Tasks	• Illustrative Mathematics (Illustrative Mathematics) • Desmos (Desmos) • Math is Fun (Math Is Fun)
Assessment Examples	• Sample SBAC Assessment Item 8.SP.A.3 SBAC Sample Assessment Items

Statistics and Probability

Cluster

Investigate patterns of association in bivariate data.

NVACS 8.SP.A.4 (Supporting Work)

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. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

Element	Exemplars
Standards for Mathematical Practice	• MP 1 Students solve problems using a linear model in the context of bivariate data. • MP 2 Students informally assess a line of best fit to data. • MP 4 Students use a linear model to solve problems. • MP 6 Students solve problems efficiently, accurately, and with the degree of precision appropriate for the contest of the problem. (Miles and Williams, 2016)
Instructional Strategies	• Research real-world examples of categorical data found on the internet. • Organize student generated data into two-way tables. • Use a table, or excel spreadsheet to create the two-way table. • Use analytical reasoning to determine what, if any, relationships exist.
Prerequisite Skills	• Conversion between decimals, fractions, and percents
Connections Within and Beyond Grade Level	• Students have already learned how to display data in tables and charts, and know they can use the data to draw inferences about the population. • In Algebra, students learn to use joint, marginal, and conditional relative frequencies to analyze and determine possible associations more thoroughly. • Conditional probability • Interpret relative frequencies. • Distinguish between correlation and causation.
Instructional Examples/Lessons/ Tasks	• Illustrative Mathematics (Illustrative Mathematics) • CPalms (CPalms)
Assessment Examples	• Sample SBAC Assessment Item 8.SP.A.4 SBAC Sample Assessment Items

Acknowledgements

April Acosta
Clark County School District

Bethany Andrews
Clark County School District

Kristin Asa
Clark County School District

Jennifer Barczyszyn
Clark County School District

JoEtta Barto
Humboldt County School District

Erica Cazett
Clark County School District

Carolyn Cook
Carson City School District

Christine Corbin
Clark County School District

Rachel Croft
Carson City School District

Dana Dyer
Clark County School District

Virginie Eldridge
Elko County School District

Rebecca Glasser
Clark County School District

Theresa Guthrie
Elko County School District

Kristen Holzhause
Clark County School District

Heather Hoyle
Douglas County School District

Robin Kato
Carson City School District

Andrea Keller
Clark County School District

Marcia Klink
Clark County School District

Kathy Lawrence
Washoe County School District

Sarah Lobsinger
Carson City School District

Jennifer Loescher
Clark County School District

Mike Liu
Business Member

Deena Lyons
Clark County School District

Dana Martin
Clark County School District

Candice Meiries
Southern RPDP

Heidi Marmo
Clark County School District

Julie Michel
Douglas County School District

Christin O'Keefe
Washoe County School District

Shannone Paki
Clark County School District

Barbara Perez
Clark County School District

Terri Romaniello
Clark County School District

Sheri Sanchez
Elko County School District

Stacey Samuels
Clark County School District

Carly Strauss
Douglas County School District

Sara Swanson
Clark County School District

Connie Thomson
Elko County School District

Channon Toles
Washoe County School District

Denise Trakas
Washoe County School District

Lynn Trell
Clark County School District

Wendy Weatherwax
Clark County School District

Adrienne Wiggins
Carson City School District

Kim Whisler
Carson City School District

Teresa Yeoman
Clark County School District

Hillary Zeune de Soto
Clark County School District

References

(n.d.). Retrieved from https://teacher.desmos.com

(n.d.). Retrieved from http://rpdp.net/

(n.d.). Retrieved from https://www.nctm.org/

(n.d.). Retrieved from https://illuminations.nctm.org/

(n.d.). Retrieved from https://ccsd.softchalkcloud.com/login

(n.d.). Retrieved from http://new.gctm-resources.org/gctm/reflections/spring2016/

Educator Toolkits. (n.d.). Retrieved from http://www.cpalms.org/Public

Great Minds. (n.d.). Retrieved from https://greatminds.org/

Hands-On Activities for Pythagorean Theorem. (n.d.). Retrieved from https://www.mathgiraffe.com/blog/hands-on-explorations-of-the-pythagorean-theorem

Illustrative Mathematics. (n.d.). Retrieved from https://www.illustrativemathematics.org/

Math is Fun. (n.d.). Retrieved from https://www.mathisfun.com/

Math Shorts Videos. (n.d.). Retrieved from https://www.uen.org/mathshorts/

Mathematics Assessment Project. (n.d.). Retrieved from http://map.mathshell.org/

Miles, R. H., & Williams, L. A. (2016). *The common core mathematics companion: The standards decoded, grades 6-8: What they say, what they mean, how to teach them*. Thousand Oaks, CA: Corwin.

Online Math Help & Learning Resources. (n.d.). Retrieved from https://www.onlinemathlearning.com/

Real World Math Problems. (n.d.). Retrieved from http://www.mathalicious.com

Roberts, D. (n.d.). Math Bits Secondary Math Resources with the Common Core. Retrieved from https://mathbits.com/

Secondary Mathematics Professional Development Center. (n.d.). Retrieved from https://www.radford.edu/rumath-smpdc/

Smart Curriculum. Smarter Teaching. (n.d.). Retrieved from https://learnzillion.com/p/

Smarter Balanced Single Sign On. (n.d.). Retrieved from https://sso.smarterbalanced.org/auth/UI/Login

Welcome to Achieve the Core. (n.d.). Retrieved from https://achievethecore.org/

Welcome to ALEX: A Perfect Fit 4 Deeper Learning. (n.d.). Retrieved from https://alex.state.al.us/

Jhone Ebert

Superintendent of Public Instruction

Jonathan Moore, Ed.D

Deputy Superintendent for Student Achievement

Dave Brancamp

Director of Standards and Instructional Support

Tracy Gruber

K-12 Mathematics Education Program Professional