NSCAS NEBRASKA STUDENT-CENTERED ASSESSMENT SYSTEM

Summative Assessment
Mathematics HS Range Achievement Level Descriptors

What are Range Achievement Level Descriptors?

Range Achievement Level Descriptors (ALDs) demonstrate how skills described in the Nebraska College and Career Ready Standards for Mathematics likely change and become more sophisticated as ability and performance increases. The ALDs also describe the evidence needed to help infer where a student is along the range. This range is defined by Nebraska using three levels:

- Developing – not yet demonstrating proficiency
- On Track – demonstrating proficiency
- Advanced– demonstrating advanced proficiency

The ALDs help show the within-standard reasoning complexity that increases in sophistication as the achievement levels increase. Such skill advancement is often related to increases in content difficulty, increases in reasoning complexity, and a reduction in the supports required for students to demonstrate what they know within a task or item.

The Range ALDs provide a way to communicate a progression that is visible and usable to all stakeholders, while also providing a foundation for a robust bank of assessment items that meets the needs of all Nebraska students.

How were the Nebraska's Mathematics Range ALDs updated for the new standards?

Draft Range ALDs for the new standards were created and reviewed by panels comprised of Nebraska educators during Spring of 2023. The updated ALDs were shared with NDE and their feedback was applied.

How will Nebraska's ELA Range ALDs change in relation to the new standards?

The updated ALDs were revised to reflect the new standards. The updated ALDs will be taken to the 2023 Item Writing Workshop where they will be used to help facilitate item writing. Feedback will be recorded at the upcoming Item Writing Workshop from Nebraska educators based on their use of the ALDs for writing items and at the upcoming standard setting from panelists. This feedback will then be used to update the ALDs. The updated ALDs will be shared with NDE to obtain their final recommendations.

NSCAS Mathematics
HS Range ALDs

Indicator	Developing learners do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska College and Career Ready Standards. A developing learner…	On Track learners demonstrate proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska College and Career Ready Standards. An on-track learner…	Advanced Benchmark learners demonstrate advanced proficiency in the knowledge and skills necessary at this grade level, as specified in the assessed Nebraska Advanced Standards. An advanced learner…
NUMBER: Students will solve problems and reason with number concepts using multiple representations, make connections within math and across disciplines, and communicate their ideas.			
HS.N.1 Estimation and Technology: Students will use estimation strategies and technology to reason, to solve problems, and to make connections within mathematics and across disciplines.			
HS.N.1.a Select, apply, and explain the method of computation when problem solving using real numbers (e.g., models, mental computation, paper-pencil, technology).	Assessed at the local level		
HS.N.1.b Determine if the context of a problem calls for an approximation or an exact value.	Identifies values as being approximations or exact values based on the context. DOK: 1 Max DOK: 1	Determines if the context of a problem calls for an approximations or exact values. DOK: 1 Max DOK: 1	Explains why a problem calls for an approximations or exact values based on the context. DOK: 1 Max DOK: 1
HS.N.1.c Determine the rounding convention to be used based on the context of a problem.	None at this level.	Determines the rounding conventions to be used based on the context of a problem. DOK: 1 Max DOK: 1	Explains the rounding conventions to be used based on the context of a problem. DOK: 1 Max DOK: 1
HS.N.1.d Estimate a value using the concept of betweenness by bounding above and below (e.g., since log(10) = 1 and log(1,000) = 3 we know log(500) is between 1 and 3).	Compares a value given in radical or logarithmic form to another value in the same form that can be simplified to an integer. DOK: 1 Max DOK: 1	Estimates values given in radical or logarithmic form to be between two integer values. DOK: 1 Orders a list of values given in radical or logarithmic form from least to greatest. DOK: 1 Max DOK: 1	Explains why a value given in radical or logarithmic form is between two integer values. DOK: 2 Max DOK: 2
HS.N.1.e Determine the tolerance interval and percent of error in measurement.	Identifies values that are within or outside of a tolerance interval. DOK: 1 Max DOK: 1	Determines the tolerance intervals of measurements based on the measuring unit. DOK: 1 Determines the percent errors of measurements based on the measuring unit. DOK: 1 Max DOK: 1	Explains why there is an error in measurement. DOK: 2 Explains what values are possible given the value and tolerance interval of a measurement and why. DOK: 1 Max DOK: 2
HS.N.1.f Convert equivalent rates (e.g., miles per hour to feet per second).	Determines equivalent rate measurements within one system of measurement, metric or customary, where only one unit is converted (i.e. numerator or denominator). May include context. May include multiple conversions within the unit. DOK: 1 Information for conversions must be provided in the item or on a reference sheet. Max DOK: 1	Determines equivalent rate measurements within one system of measurement, metric or customary, where both units are converted (i.e. numerator or denominator). May include context. May include multiple conversions within each unit. DOK: 1 Determines equivalent rate measurements between two systems of measurement, metric and customary, where only one unit is converted (i.e. numerator or denominator). May include context. May include multiple conversions within the unit. DOK: 1 Information for conversions must be provided in the item or on a reference sheet. Max DOK: 1	Determines equivalent rate where both units are converted (i.e. numerator or denominator) and at least one is between two systems. May include context. May include multiple conversions within each unit. DOK: 1 Information for conversions must be provided in the item or on a reference sheet. Max DOK: 1

HS.N.1.g Determine whether extremely large or extremely small quantities can be reasonably represented by a calculator or graphing utility.	Identifies a value or image from a calculator that is not reasonably represented. DOK: 1 Max DOK: 1	Determines whether extremely large or extremely small quantities can be reasonably represented by a calculator or graphing utility. May include a context. DOK: 1 Max DOK: 1	Explains why extremely large or extremely small quantities can or cannot be reasonably represented by a calculator or graphing utility. May include a context. DOK: 1 Max DOK: 1
HS.N.1.h Use scientific notation to appropriately represent large and small quantities.	None at this level.	Expresses estimates of very large or very small quantities using scientific notation given exact quantities . May include context. DOK: 1 Adds, subtracts, multiplies, and/or divides expressions involving scientific notation. (Numbers may require conversion to scientific notation.) DOK: 1 Max DOK: 1	Expresses how many times as large or small one quantity is than another quantity when one or both quantities are in scientific notation. May include context. DOK: 2 Max DOK: 2
HS.N.2 Sets and Operations: Students will use number sets and operations to reason and to solve problems.			
HS.N.2.a Extend the properties of exponents to rational numbers.	Identifies that an expression with an exponent of 1/2 or 1/3 is the same as square root or cube root, respectively. DOK: 1 Simplifies and evaluates expressions with exponents of -1/2 for perfect squares less than or equal to 400 or exponents of -1/3 for perfect cubes from -125 to 125. May also include negative integer exponents of rational numbers. DOK: 1 Simplifies and evaluates expressions with positive or negative rational exponents greater than 1 or less than -1 with denominator of 2 for perfect squares less than or equal to 400. See grade 8 and below for integer exponents. DOK: 1 Simplifies and evaluates expressions with positive or negative rational exponents greater than 1 or less than -1 with denominator of 3 for perfect cubes from -125 to 125. See grade 8 and below for integer exponents. DOK: 1 Max DOK: 1	Evaluates expressions involving rational exponents with denominators of 2 for perfect squares greater than or equal to 441 or less than zero. DOK: 2 Evaluates expressions involving rational exponents with denominators of 3 for perfect cubes greater than or equal to 216 or less than or equal to -216. DOK: 2 Simplifies and evaluates expressions with rational exponents with denominators of 2 or 3 for non-perfect square or cube roots. DOK: 2 Max DOK: 2	Simplifies and evaluates expressions involving rational exponents with denominators other than 2 or 3. DOK: 2 Analyzes the simplification of numerical expressions involving rational exponents at the high school level . DOK: 2 Max DOK: 2
HS.N.2.b Use properties of rational and irrational numbers.	Determines whether the sum of values are rational or irrational given that the values are rational or irrational. DOK: 1 Max DOK: 1	Identifies values that have a sum which is rational or irrational. DOK: 1 Identifies values that have a product which is rational or irrational. DOK: 1 Determines whether the product of values are rational or irrational given that the values are rational or irrational (and non-zero). DOK: 1 Max DOK: 1	Explains why the sum or product of values are rational or irrational given that the values are rational or irrational (and non-zero). DOK: 2 Max DOK: 2
HS.N.2.c Demonstrate, represent, and show relationships among the subsets of real numbers and the complex number system.	Determines sqrt(-1) is the imaginary unit i or that the square root of any negative number is imaginary. DOK: 1 Determines the subset of numbers that a sum, difference, product, or quotient belongs to based on the sets of the numbers used in the operation when those numbers are natural, whole, integer, rational, irrational, or real. (e.g., when multiplying an integer by an irrational number, to which subset will the product belong?) DOK: 1 Max DOK: 1	Classifies complex numbers in the form a + bi as natural, whole, integer, rational, irrational, real, or imaginary. For real numbers, must include 0i. DOK: 1 Determines whether a sum, difference, product, or quotient is real or imaginary based on the sets of the numbers used in the operation. At least one value must be imaginary. (e.g., determines that the product could be real or imaginary when two imaginary numbers are multiplied together). DOK: 1 Max DOK: 1	Classifies powers of i into subsets of the complex number system. (e.g., i^5 is an imaginary number or i^2 is a real number/integer). DOK: 1 Analyzes the classification of complex numbers (e.g., explains how a real number is both real and complex). DOK: 2 Max DOK: 2

HS.N.2.d Compute with subsets of the complex number system including imaginary, rational, irrational, integers, whole, and natural numbers.	Performs operations on real numbers (addition, subtraction, multiplication, division, integer exponents, and/or absolute value). Must include at least one of the following: ▪ Evaluating perfect squares greater than or equal to 441 or less than 0. Does not include rational exponents. ▪ Evaluating perfect cubes greater than or equal to 216 or less than or equal to -216. Does not include rational exponents. ▪ Adds, subtracts, multiplies, and/or divides expressions involving square and/or cube roots other than those involving integer exponents as in MA 8.N.2.b. Does not include rational exponents. ▪ Determines equivalent radical expressions for non-perfect square or cube roots. Does not include rational exponents. Max DOK: 1	Performs operations on complex numbers where only one value is pure imaginary or in the form a + bi where a ≠ 0 and b ≠ 0. (e.g. 3(4 + 2i) = ?; i^5=?) DOK: 1 Performs operations on real numbers (addition, subtraction, multiplication, division, integer exponents, and/or absolute value). Must include at least one of the following: ▪ Evaluates perfect roots other than square roots and cube roots. Does not include rational exponents. ▪ Determines equivalent radical expressions for non-perfect roots other than square or cube roots. Does not include rational exponents. ▪ Adds, subtracts, multiplies, and/or divides expressions involving a root other than a square root or cube root. Does not include rational exponents. DOK: 2 Max DOK: 1	Performs operations on complex numbers where at least one value is in the form a + bi where a ≠ 0 and b ≠ 0 and another value is pure imaginary or also in the form a + bi where a ≠ 0 and b ≠ 0. May include integer exponents or absolute value as well. DOK: 2 Analyzes high school computations within the complex number system. (e.g. explains why sqrt(2) + sqrt(3) does not equal sqrt(5)) DOK: 2 Max DOK: 2
HS.N.3 Interpretation and Sense Making: Students will reason abstractly and quantitatively using units to solve problems and interpret results in context.			
HS.N.3.a Understand roundoff error and why roundoff error accumulates when rounding occurs prior to the last step in a computation.	Assessed at the local level		
HS.N.3.b Use estimation methods to check the reasonableness of real number computations and decide if the problem calls for an approximation (including appropriate rounding) or an exact number.	Determines whether proposed estimates or proposed processes for estimating addition, subtraction, multiplication, and division of rational numbers, the use of positive integer exponents, or the use of square roots or cube roots are reasonable using appropriate strategies and tools. (May include context.) DOK: 2 Provides the best estimate using appropriate strategies and tools for a given problem involving rational numbers and the four operations and positive integer exponents (may include context). DOK: 2 Provides the best estimate using appropriate strategies and tools for a given problem involving square or cube roots (may include context). DOK: 2 Ex: Which value is the best estimate for sqrt(26)? Max DOK: 2	Determines whether proposed estimates or proposed processes for estimating for addition, subtraction, multiplication, and division of rational numbers and use of exponents and roots are reasonable using appropriate strategies and tools. (May include context.) Must include at least one square or cube root. DOK: 2 Ex: Which value is the best estimate for 4xsqrt(26)+5.02? Provides the best estimate using appropriate strategies and tools for a given problem involving rational numbers, the four operations, exponents, and square or cube roots (may include context). Must involve at least one square or cube root in addition to another operation. DOK: 2 Ex: Which value is the best estimate for...? Determines whether proposed estimates for solving problems involving two-step equations are reasonable using appropriate strategies and tools. DOK: 2 Max DOK: 2	Explains whether proposed rational number estimates for addition, subtraction, multiplication, and division of rational numbers and use of exponents and roots are reasonable using appropriate strategies and tools. (May include context.) DOK: 3 Ex: Why is … the best estimate for …? Max DOK: 3
HS.N.3.c Use units to assess the validity of an answer in the context of a problem.	Determines units that are needed or should result from single-step problems within a context. DOK: 1 Max DOK: 1	Determines units that are needed or should result from multi-step problems within a context. DOK: 1 Max DOK: 1	Explains why a solution is valid using dimensional analysis within a context. DOK: 2 Max DOK: 2
HS.N.3.d Communicate the meaning of an answer in the context of a problem.	Identifies an answer to a problem within a context that would have given meaning. DOK: 1 Max DOK: 1	Determines the meaning of an answer in the context of a problem. DOK: 2 Max DOK: 2	Explains why an answer to a problem within a context has a given meaning. DOK: 2 Max DOK: 2

ALGEBRA: Students will solve problems and reason with algebra using multiple representations, make connections within math and across disciplines, and communicate their ideas.			
HS.A.1 Algebraic Relationships: Students will demonstrate and represent relationships with functions.			
HS.A.1.a Demonstrate that functions are a well mapped subdomain of relations.	Assessed at the local level		
HS.A.1.b Analyze a relation to determine if it is a function given mapping diagrams, function notation (e.g., $f(x)=x^2$), a table, or a graph.	Identifies or creates the definiton of a function. DOK: 1 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 1	Identifies a relation as a function given its equation. Equations are limited to linear, quadratic, or absolute value equations. DOK: 1 Identifies a relation as a function given its graph, a table/list of ordered pairs, or a mapping. DOK: 1 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 1	Explains why a relation, presented in any format, is or is not a function. Equations are limited to linear, quadratic, or absolute value equations. DOK: 2 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 2
HS.A.1.c Classify a function given its mapping diagram, function notation, table, or graph as a linear, quadratic, absolute value, exponential, or other function.	Determines which functions are linear and nonlinear functions from their graphs and/or equations. DOK: 1 Determines which functions are linear and quadratic functions from their graphs and/or equations. Does not require distinguishing quadratic from other non-linear functions. DOK: 1 Coefficients and constants are rational numbers, and exponents are integers. Does not require knowing the names of other non-linear functions. Max DOK: 1	Determines which functions are linear and nonlinear functions from tables/list of ordered pairs or mapping. DOK: 1 Determines which functions are linear, quadratic, absolute value, and exponential from tables/list of ordered pairs or mapping. DOK: 1 Determines which functions are linear, quadratic, absolute value, and exponential from their graphs and/or equations. DOK: 1 Explains why a function is linear given a table/list of ordered pairs or mapping. DOK: 2 Explains why a function is quadratic, absolute value, or exponential given its graph or equation. DOK: 2 Explains why a function is linear given its graph or equation. DOK: 1 Coefficients and constants are rational numbers, and exponents are integers. Does not require knowing the names of other non-linear functions. Max DOK: 2	Explains why a function is quadratic, absolute value, or exponential given a table/list of ordered pairs or mapping. DOK: 2 Coefficients and constants are rational numbers, and exponents are integers. Does not require knowing the names of other non-linear functions. Max DOK: 2
HS.A.1.d Analyze a function’s domain and range to determine if it is one-to-one and has an inverse function both algebraically and graphically.	Determines the domain and range of a function from its graph. DOK: 1 Determines the domain and range of a linear function from its equation. DOK: 1 Determines the domain of a quadratic or absolute value function from its equation. DOK: 1 Determines the general definition of an inverse function. DOK: 1 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 1	Determines the range of a quadratic or absolute value function from its equation. DOK: 2 Determines if a function is has an inverse (i.e. is one-to-one) given a graph or equation. DOK: 2 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 2	Analyzes the domain and range of a given linear, quadratic, or absolute value functions. (e.g., Why is the domain of $f(x) = x^2$ all real numbers but the range is only all real numbers greater than or equal to zero?) DOK: 2 Explains why a function may or may not have an inverse given a table or mapping of the function. DOK: 2 Coefficients and constants are rational numbers, and exponents are integers. Max DOK: 2

HS.A.1.e Define, interpret, and analyze linear, quadratic, absolute value, and exponential functions using the points of interest of the functions and graphing technology.	Determines the graph of a linear function given the slope and y-intercept or given both intercepts. DOK: 1 Determines which functions are absolute value functions given graphs of functions. DOK: 1 Determines the vertex, maximum, minimum, intercepts, and line of symmetry of an absolute value function or quadratic function given its graph or table of values. DOK: 1 Determines the intercepts and asymptotes of an exponential function given its graph or table of values. DOK: 1 Max DOK: 1	Compares intercepts and slope/rate of change for two different functions. Functions may be provided in similar formats or in different formats. DOK: 2 Determines the vertex, maximum, minimum, intercepts, and line of symmetry of an absolute value function or quadratic function given its equation. DOK: 2 Determines the intercepts and asymptotes of an exponential function given its equation. DOK: 2 Max DOK: 2	Interprets the meaning of the slope, vertex, maximum, minimum, intercepts, line of symmetry, or asymptote of a function within a context. (Functions include linear, quadratic, absolute value, and exponential functions.) DOK: 2 Max DOK: 2
HS.A.1.f Identify, analyze, and apply transformations of existing functions (including translation and dilation).	Identifies the type of transformation to an existing function given the graphs of both. (Functions can include linear, quadratic, absolute value, and exponential.) DOK: 1 Max DOK: 1	Determines the vertical and/or horizontal translation of a function given the equation of the parent original function and the new function in vertex form and vice versa. (Functions can include linear, quadratic, absolute value, and exponential.) DOK: 2 Determines the effect of the coefficient on a function (stretch/compression/slope/direction) given the parent function and the new function and vice versa. (What is the transformation on f(x)= abs(x) to g(x) = -2abs(x)?) May not include translations. (Functions can include linear, quadratic, absolute value, and exponential.) DOK: 2 Max DOK: 2	Determines the effect of the coefficient and a horizontal and/or vertical translation on a function given the parent function and the new function and vice versa. (Functions can include linear, quadratic, absolute value, and exponential.) DOK: 2 Max DOK: 2
HS.A.1.g Interpret logarithmic equations as exponential equations.	Identifies that the inverse of an exponential is a logarithm and vice versa. (Does not require generating an equation.) DOK: 1 Identify the inverse of an exponential from a graph. DOK: 1 Max DOK: 1	Determines the exponential equation that is equivalent to a given logarithmic equation and vice versa. DOK: 2 Max DOK: 2	Solves a logarithmic equation that requires converting to an exponential first. DOK: 2 Max DOK: 2
HS.A.1.h Describe arithmetic sequences using tables of values and functions in explicit and recursive forms.	Identifies a sequence as being arithmetic given a table of values or equation. (Equations can be explicit or recursive.) DOK: 2 Max DOK: 2	Determines the equation or word phrase that describes an arithmetic sequence given a list or table of values. (Equations can be explicit or recursive.) DOK: 2 Determines the word phrase that describes an arithmetic sequence given an equation. (Equations can be explicit or recursive.) DOK: 2 Max DOK: 2	Explains why a sequence is or is not arithmetic given a table of values or equation. DOK: 2 Converts an equation of an arithmetic sequence between it's explicit and recursive form. DOK: 2 Max DOK: 2
HS.A.1.i Describe geometric sequences using tables of values and functions in explicit and recursive forms.	Identifies a sequence as being geometric given a table of values or equation. (Equations can be explicit or recursive.) DOK: 2 Max DOK: 2	Determines the equation or word phrase that describes a geometric sequence given a list or table of values. (Equations can be explicit or recursive.) DOK: 2 Determines the word phrase that describes a geometric sequence given an equation. (Equations can be explicit or recursive.) DOK: 2 Max DOK: 2	Explains why a sequence is or is not geometric given a table of values or equation. DOK: 2 Converts an equation of a geometric sequence between it's explicit and recursive form. DOK: 2 Max DOK: 2
HS.A.2 Algebraic Processes: Students will apply the operational properties when evaluating rational expressions and solving linear and quadratic equations, and inequalities.			

HS.A.2.a Analyze and explain the properties used in solving equations, inequalities, systems of linear equations, systems of linear inequalities, and literal equations.	Determines the solution from the graph given the graph of a system of linear equations in two variables. DOK: 1 Determines the sector of a graph that represents the solution to a system of inequalities. DOK: 1 Solves a system of linear equations in two variables given a table of values and/or equations when at least one variable has a coefficient of 1 or 0. DOK: 2 Determines when systems of linear equations have no solution or infinitely many solutions. DOK: 1 See 8.A.1.a for identifying when one-variable equations have no solution or infinitely many. All linear systems should be two variables. Max DOK: 2	Solves a system of linear equations in two variables given a table of values and/or equations when all variables have coefficients other than 1 or 0. DOK: 2 Determines a graph that represents a given system of linear inequalities in two variables. DOK: 2 Determines that when a system of linear equations has infinitely many solutions, the solution is the equation of the line. DOK: 2 Determines when systems of linear inequalities have no solution or infinitely many solutions. DOK: 2 Explains the method or steps of solving equations, inequalities, systems of linear equations, systems of linear inequalities, or contextual equations. (This may involve explaining single or multiple steps). DOK: 2 All linear systems should be two variables. Max DOK: 2	Analyzes solutions to systems of linear equations and inequalities in two variables with or without a context. DOK: 2 Ex: With the given restaints, are Patti's estimates feasible? Ex: Explain why (2, 40) is or is not a solution to the system. Solves a system of linear equations in three variables given a table of values and/or equations when all variables have coefficients other than 1 or 0. DOK: 2 Max DOK: 2
HS.A.2.b Generate expressions in equivalent forms by using algebraic properties to make different characteristics or features visible.	Determines the slope-intercept form of an equation given a different form. DOK: 2 Max DOK: 2	Determines the vertex form of a quadratic equation given an alternate form. DOK: 2 Determines the factored form of a quadratic equation given an alternate form. DOK: 2 Determines an equivalent expression based on a specific need in the given context. DOK: 2 Max DOK: 2	Explains how the quantities in equivalent expressions are related in terms of a given context or justifies the form used. DOK: 2 Max DOK: 2
HS.A.2.c Analyze equations and inequalities to determine and apply efficient methods to solve and use appropriate technology as needed.	Identifies properties of equality/inequality/operations when used in isolation. (e.g., Which property of equality is represented by a + b = b + a?) DOK: 1 Max DOK: 1	Identifies multiple properties of equality/inequality/operations. DOK: 1 Writes an equation using a named property or writes the property given the equation. DOK: 2 Completes an algebraic proof when solving a linear or quadratic equation or linear inequality, given a partially completed proof. DOK: 2 Identifies the algebraic proof for a given linear or quadratic equation or linear inequality. DOK: 1 Max DOK: 2	Writes an algebraic proof for a given linear or quadratic equation or linear inequality. DOK: 2 Max DOK: 2
HS.A.2.d Calculate the slope (rate of change) of a line given coordinate points, a graph, or a table of values.	Determines the slope of a line given the graph. DOK: 1 Max DOK: 1	Determines the slope of a line given two points on the line or a table of values. DOK: 2 Max DOK: 2	None at this level.
HS.A.2.e Write and graph equations of functions (linear, absolute value, quadratic, and exponential) using the points of interest of the function.	Determines the graph of a linear function (including constant functions) or vertical line given the equation in any form and vice versa. Proportional relationships must use function notation. Otherwise, see grade 8. DOK: 1 Determines the equation of a line given the slope/rate of change and an intercept of the linear function. DOK: 1 Identifies the graph of an absolute value function or exponential function given its equation and vice versa. DOK: 1 Identifies the graph of a quadratic function given its equation in vertex form and vice versa. DOK: 1 Max DOK: 1	Determines the equation of a line given the slope/rate of change and points that are non-intercepts for the linear function. DOK: 2 Determines the equation of a line given points on the line. Points can be ordered pairs, data in table, or points in graph. DOK: 2 Writes the absolute value equation, quadratic equation, or exponential equation for a function given its given its graph or table. DOK: 2 Identifies the graph of a quadratic function given its equation in standard form and vice versa. DOK: 2 Max DOK: 2	Identifies the graph of an absolute value function given its piece-wise equation and vice versa. DOK: 2 Writes the piece-wise equation for an absolute value function given its graph. DOK: 2 Max DOK: 2

HS.A.2.f Given a line, write the equation of a line that is parallel or perpendicular to it.	Determines the slope of parallel lines given the equation, two points on one line, or graph of one line. DOK: 2 Determines the graph of a line parallel or perpendicular to a given line whose graph provided. DOK: 1 Max DOK: 2	Determines the slopes of perpendicular lines given the equation, two points on one line, or graph of one line. DOK: 2 Determines the equation or graph of a line perpendicular to a given line whose equation is provided. DOK: 2 Determines the equation or graph of a line parallel to a given line whose equation provided. DOK: 1 Max DOK: 2	Determines the equation of a line perpendicular or parallel to a given line whose equation is not provided. DOK: 2 Max DOK: 2
HS.A.2.g Perform and explain operations such as addition, subtraction, multiplication, division, and factoring on polynomials.	Adds or subtracts polynomial expressions with one variable. DOK: 1 Multiplies mononomial and binomial expressions. DOK: 1 Divides a binomial by a mononomial expression. DOK: 1 Max DOK: 1	Adds or subtracts polynomial expressions with more than one variable. DOK: 1 Multiplies polynomial expressions. (neither should be mononomial) DOK: 2 Factors polynomial expression. DOK: 2 Divides quadratic polynomial by a binomial. (Should not require remainders) DOK: 2 Max DOK: 2	Explains the steps taken to add, subtract, multiply, divide, or factor polynomial expressions. DOK: 2 Max DOK: 2
HS.A.2.h Explain the connection between the factors of a polynomial and the zeros of a polynomial.	Determines the real or imaginary zeros of a quadratic equation given the equation in factored form equal to zero. DOK: 1 Determines the zeros of the equation when given a polynomial equation of degree 3 or higher in factored form equal to zero. DOK: 1 Max DOK: 1	Determines the corresponding factored form of a quadratic equation or a polynomial of degree 3 or higher equal to zero given its real or imaginary zeros. DOK: 1 Explains how the factors of a polynomial are related to the zeros of a polynomial. DOK: 2 Max DOK: 2	Analyzes an explaination about how the factors of a polynomial are related to the zeros of a polynomial. DOK: 2 Max DOK: 2
HS.A.2.i Combine functions by composition and perform operations on functions.	Adds functions with rational coefficients and integer exponents and determines the sum's corresponding domain. DOK: 2 Subtracts functions with rational coefficients and integer exponents and determines the difference's corresponding domain. DOK: 2 Functions are limited to linear, quadratic, and absolute value. Max DOK: 2	Composes two functions with rational coefficients and integer exponents and determines the composition's corresponding domain. Does not require division by a non-constant function. DOK: 2 Multiplies functions with rational coefficients and integer exponents and determines the product's corresponding domain. DOK: 2 Divides functions with rational coefficients and integer exponents and determines the quotient's corresponding domain when there is no remainder. DOK: 2 Functions are limited to linear, quadratic, and absolute value. Max DOK: 2	Composes functions with rational coefficients and integer exponents that requires division of a non-constant function and determines the composition's corresponding domain. DOK: 2 Composes functions with irrational coefficients and/or rational exponents and determines the new function's corresponding domain. DOK: 2 Functions are limited to linear, quadratic, and absolute value. Max DOK: 2
HS.A.3 Applications: Students will solve authentic problems using nonlinear functions.			
HS.A.3.a Analyze and model authentic situations using various representations and appropriate technology.	Models authentic problems that can be solved with linear equations or inequalities involving real numbers in any form. DOK: 2 Max DOK: 2	Models multi-step authentic problems that can be solved with equations or inequalities involving real numbers in any form when at least one of the steps involves raising numbers to a rational exponent or operations on irrational numbers. DOK: 2 Models authentic problems involving systems of linear equations or inequalities, quadratic, or absolute value functions. May include interpreting their graphs in context. DOK: 2 Max DOK: 2	Models authentic problems involving polynomial (non-quadratic, non-linear), exponential, or square root functions. Does not require analyzing features of graphs. DOK: 2 Analyzes solutions to authentic problems involving linear equations, inequalities, systems of linear equations, quadratic, or absolute value functions. DOK: 3 Max DOK: 3

HS.A.3.b Identify, interpret, relate, and graph the factors, x-intercepts, roots, and zeros of polynomial functions using algebraic and graphing methods.	Identifies polynomials that have a given number of real roots and degree. (The value of the roots should not be given). DOK: 1 Max DOK: 1	Identifies the roots of a polynomial given the equation in factored form. DOK: 1 Identifies the equation of a polynomial in factored form given the graph. DOK: 1 Identifies the number of real and imaginary roots of a polynomial given the equation in factored form. DOK: 1 Identifies the number of real and imaginary roots of a polynomial given the graph and degree.. DOK: 1 Identifies graphs of polynomials given the factors, x-intercepts, roots, or zeros. DOK: 1 Identifies the maximum number of real roots of a polynomial given the degree. DOK: 1 Max DOK: 1	Interprets the meaning of the zeros of a polynomial equations given the context. DOK: 2 Explains why the degree of a polynomial limits the number of roots. DOK: 2 Max DOK: 2
HS.A.3.c Identify and predict appropriate solutions to equations given context and domain/range (e.g., extraneous solutions, imaginary solutions, no solution, infinitely many solutions).	Identifies and appropriate domain and/or range given the context of a problem. DOK: 2 Identifies the graph of a function that best matched the context of a problem (based on domain and range). DOK: 2 Max DOK: 2	Identifies contexts that are represented by a given domain and or range. DOK: 2 Determines the domain and/or range of a function based on the context. DOK: 2 Determines which values of a function are appropriate solutions within a context (value could be given as coordinates or real/imaginary roots). DOK: 2 Identifies the number of appropriate solutions of a function given the context and the graph and/or equation. (no solution, finite solutions, infinite solutions, etc.) DOK: 2 Max DOK: 2	Explains why certain solutions or portions of a graph are not reasonable given the context of a problem. DOK: 2 Max DOK: 2
GEOMETRY: Students will solve problems and reason with geometry using multiple representations, make connections within math and across disciplines, and communicate their ideas.			
TOOLS: Students will sketch, draw, and construct appropriate representations using a variety of tools and methods which may include ruler/straight edge, protractor, compass, reflective devices, paper folding, or dynamic geometric software.			
HS.G.1 Attributes: Students will identify and describe geometric attributes, apply properties and theorems, and create two-dimensional shapes.			
HS.G.1.a Demonstrate that two figures are similar or congruent by using a sequence of rigid motions and dilations that map a figure onto the other in problems both with and without coordinates.	Names which types of transformations preserve congruence or similarity. DOK: 1 Max DOK: 1	Determines congruence or similarity of two or more figures on or off the coordinate plane when shown multiple figures with required side measures labeled. DOK: 1 Determines if the image and pre-image are congruent or similar when given a single or series of transformations. DOK: 2 Max DOK: 2	Determines congruence or similarity of two or more figures on or off the coordinate plan when shown multiple figures and not all required side lengths are labeled. Side lengths can be determined based on information given or from the diagram. DOK: 2 Explains or justifies why a series of transformations does or does not preserve congruence or similarity. DOK: 3 Ex: Explain why two different sets of transformations on the same pre-image results in different images. Max DOK: 3

HS.G.1.b Describe symmetries of a figure in terms of rigid motions that map a figure onto itself and make inferences about symmetric figures (e.g., unknown side lengths or angle measures) in problems both with and without coordinates.	Identifies a line of symmetry as a line of reflection. DOK: 1 Identifies a point of symmetry as a center of rotation. DOK: 1 Max DOK: 1	Identifies which reflections and/or rotations will map a figure onto itself with or without coordinates. DOK: 1 Determines missing sides or angles of a figure given that the figure is symmetric. DOK: 1 Max DOK: 1	Determines possible figures given a description of the rigid motions that map the figure to itself. DOK: 2 Max DOK: 2
HS.G.1.c Explain how the criteria for triangle congruence and similarity (ASA, SAS, AAS, and SSS congruence; AA similarity criterion) follow from the definition of congruence and similarity in terms of corresponding parts.	Identifies congruent or similar triangles based on ASA, SAS, AAS, SSS, and/or AA. DOK: 2 Max DOK: 2	Explains how the criteria for triangle congruence or similarity (ASA, SAS, AAS, SSS, and/or AA) follow from the definition of congruence and similarity in terms of corresponding parts. DOK: 3 Max DOK: 3	Analyzes explanations how the criteria for triangle congruence or similarity (ASA, SAS, AAS, SSS, and/or AA) follow from the definition of congruence and similarity in terms of corresponding parts. DOK: 3 Max DOK: 3
HS.G.1.d Identify and apply right triangle relationships including converse of the Pythagorean Theorem.	None at this level. See 8.G.3.b	Applies the Pythagorean Theorem in mathematical and authentic problems when the answer is in simplified radical form. DOK: 2 Refer to 8.G.3.b for applying the Pythagorean Theorem to find side lengths of triangles, determine if a triangle is a right triangle, and to solve authentic problems when the answer is not in simplified radical form. Max DOK: 2	Applies the Pythagorean Theorem in mathematical and authentic problems in three-dimensions. DOK: 2 Max DOK: 2
HS.G.1.e Apply side and angle relationships of special right triangles (30 degree-60 degree-90 degree and 45 degree-45 degree-90 degree) to solve geometric problems.	Determines when a triangle is 30-60-90 or 45-45-90 when given 3 side lengths in radical form. DOK: 1 Max DOK: 1	Determines lengths of missing sides when given one side and one angle in a special right triangle. DOK: 2 Completes a special right triangle pattern when given two sides of a right triangle. For example: given that the leg of a right triangle measures 4 and the hypotenuse measures 8, determine that the angle opposite 4 is 30 degrees and the missing side is 4 sq rt 3 with the angle opposite it measuring 60 degrees. Side lengths are given in radical form if appropriate. DOK: 2 Max DOK: 2	Determines a missing variable in a problem that involves multiple uses of special triangles given a figure. DOK: 2 Max DOK: 2
HS.G.1.f Identify and apply right triangle relationships including sine, cosine, and tangent.	Identifies the definitions of sine, cosine, and tangent. DOK: 1 Identifies the equation for sine, cosine, and tangent (e.g., sin (x) = 5/13). DOK: 1 Max DOK: 1	Solves for sides of a right triangle that requires using sine, cosine, and/or tangent. No context. DOK: 2 Max DOK: 2	Solves authentic problems requiring sine, cosine, and/or tangent. May include quadrilaterals and congruent or similar triangles. DOK: 2 Solves mathematical or authentic problems requiring sine, cosine, and/or tangent when solving for a missing angle measurement. May include quadrilaterals and congruent or similar triangles. DOK: 2 Determines the relationship between sine, cosine, and/or tangent when given one or more of the values (e.g., given the value of sin (x), determine the value of cos (x)). DOK: 2 Max DOK: 2
HS.G.1.g Apply interior and exterior angle formulas for n-gons and apply to authentic situations.	Determines the interior or exterior angle of a triangle with or without a context. DOK: 1 Max DOK: 1	Determines the interior or exterior angle of an n-gon with or without a context. DOK: 2 Determines the number of side of an n-gon given the interior or external angles. DOK: 2 Max DOK: 2	Solves a multi-step problems where one of the steps involves the interior or exterior angle formula with or without a context. DOK: 2 Max DOK: 2
HS.G.1.h Compare/contrast the properties of quadrilaterals: parallelograms, rectangles, rhombi, squares, kites, trapezoids, and isosceles trapezoids.	Identifies which quadrilaterals have given properties. DOK: 1 Max DOK: 1	Compares and/or contrasts the properties of quadrilaterals: parallelograms, rectangles, rhombi, squares, kites, trapezoids, and isosceles trapezoids. DOK: 2 Max DOK: 2	None at this level.

HS.G.1.i Use slope and the distance formula to determine the type of quadrilateral.	None at this level. Refer to 8.G.3.b-c for applying the Pythagorean Theorem to find side lengths of triangles, determine if a triangle is a right triangle, and to solve authentic problems.	Given coordinates that represent a quadrilateral, determines whether it is a square, rectangle, or parallelogram. DOK: 2 Given that a quadrilateral is a square, rectangle, or parallelogram, determines a third and/or fourth point given at least two points that make up the quadrilateral. DOK: 2 Max DOK: 2	Given coordinates that represent a quadrilateral, determines whether it is a trapezoid, isosceles trapezoid, rhombus, or kite. DOK: 2 Given that a quadrilateral is a trapezoid, isosceles trapezoid, rhombus, or kite, determines a third and/or fourth point given at least two points that make up the quadrilateral. DOK: 2 Reminder: NDE uses the exclusive definition of a trapezoid (exactly 1 pair of parallel sides). Max DOK: 2
HS.G.1.j Identify, describe, apply, and reason through properties of central angles, inscribed angles, angles formed by intersecting chords, secants, and/or tangents to find the measures of angles related to the circle, arc lengths, and areas of sectors.	Determines the arc length given the circumference of a circle and the central angle. DOK: 2 Determines the area of a sector given the area of the circle and the central angle. DOK: 2 Max DOK: 2	Determines measures of angles and arc lengths related to a circle that require the application of central angles, inscribed angles, and external angles formed by intersecting secants, intersecting tangents, or a secant and a tangent. DOK: 2 Determines the arc length when either the circumference or the central angle has to be determined from other given information. DOK: 2 Determines the area of a sector when either the area or the central angle has to be determined from other given information. DOK: 2 Max DOK: 2	Determines measures of angles and arc lengths related to a circle that require application of angles formed by two chords. DOK: 2 Determines the arc length when both the circumference and the central angle has to be determined from other given information. DOK: 2 Determines the area of a sector when both the area and the central angle has to be determined from other given information. DOK: 2 Max DOK: 2
HS.G.2 Attributes: Students will identify and describe geometric attributes, apply properties and theorems and create three-dimensional shapes.			
HS.G.2.a Convert between various units of volume (e.g., cubic feet to cubic yards).	Converts between units for volume within the same system. DOK: 2 Max DOK: 2	Converts between units for volume across the two systems. DOK: 2 Max DOK: 2	Solves authenic problems that require only the conversion between units for volume across the two systems. DOK: 2 Max DOK: 2
HS.G.2.b Apply the effect of a scale factor to determine the volume of similar three-dimensional shapes and solids.	Determines the scale factor between volume for similar solids when given only the scale factor between corresponding lengths of the shapes or solids. Volume cannot be determined from given values in the problem to then determine scale factor. May include context. (e.g. The scale factor between the length of the base between solid A and solid B is 0.5. What value can the volume of solid A be multiplied by to determine the volume of solid B?) DOK: 2 Max DOK: 2	Determines the volume of a similar solid given the volume of the original solid and the scale factor between corresponding lengths of the solids. May include context. DOK: 2 Max DOK: 2	Determines the volume of a similar solid given the volume of the original solid and the scale factor between corresponding lengths of the shapes must be determined. Information should be limited such that the scale factor is needed to determine volume. May include context. DOK: 2 Max DOK: 2
HS.G.2.c Determine surface area and volume of pyramids, as well as solids that are composites of pyramids, prisms, spheres, cylinders, and cones, using formulas and appropriate units.	Determines volume of right pyramids without the need for trigonometry beyond the Pythagorean Theorem. May include context. DOK: 2 Max DOK: 2	Determines surface area of pyramids, as well as solids that are composites of pyramids, prisms, spheres, cylinders, and cones where areas can be determined without the need for trigonometry beyond the Pythagorean Theorem or application of angles/special segments related to circles. May include context. DOK: 2 Determines an unknown dimension of a pyramid when given the volume and another dimension (may include context). DOK: 2 Compares volumes or surface areas of right pyramids and/or composite shapes. DOK: 2 Max DOK: 2	Determines surface area of pyramids, as well as solids that are composites of pyramids, prisms, spheres, cylinders that require use of sine, cosine, or tangent or application of angles/special segments related to circles. May include context. DOK: 2 Determines the volume of pyramids, as well as solids that are composites of pyramids, prisms, spheres, cylinders that require use of sine, cosine, or tangent or application of angles/special segments related to circles. May include context. DOK: 2 Max DOK: 2
HS.G.3 Coordinate Geometry and Transformations: Students will demonstrate and represent location, orientation, and relationships on the coordinate plane.			

HS.G.3.a Derive the midpoint formula using the concept of average and apply the midpoint formula to find coordinates.	Determines the midpoint between two points on the coordinate plane given the ordered pairs of the points between which the midpoint lies. May be shown with or without the coordinate plane. May include context. DOK: 2 Derivation is locally assessed. Max DOK: 2	Given the midpoint between two points on the coordinate plane and one of the ordered pairs of the points between which the midpoint lies, determines the other ordered pair. May be shown with or without the coordinate plane. May include context. (e.g., Given that (1,1) is the midpoint between (-1,-1) and (x,y), what is (x,y)?) DOK: 2 Max DOK: 2	Applies the midpoint formula to other geometric figures. (e.g., given the endpoints of the diameter of a circle, what is the center of the circle?). DOK: 2 Max DOK: 2
HS.G.3.b Find the images and preimages of transformations of a point, shape, or a relation on the coordinate plane. Transformations include the following and their compositions: reflections across horizontal and vertical lines and the lines y=x and y=-x, rotations about the origin of 90 degrees, dilations about the origin by any positive scale factor, and any translation.	Determines the image of a point, shape, or a relation on the coordinate plane after a single transformation given the preimage. DOK: 2 Determines the preimage of a point, shape, or a relation on the coordinate plane after a single transformation given the image. DOK: 2 Max DOK: 2	Determines the image of a point, shape, or a relation on the coordinate plane after a series of transformations given the preimage. DOK: 2 Determines the preimage of a point, shape, or a relation on the coordinate plane after a series of transformations given the image. DOK: 2 Max DOK: 2	Determines the image or preimage of a point, shape, or a relation on the coordinate plane after a series of transformations when the transformation is given in algebraic notation. DOK: 2 Max DOK: 2
HS.G.3.c Find the equation of a circle given the radius and the center.	Determines the equation of a circle given its radius or diameter and center at the origin or given a diagram or graph where radius can be read from the diagram/graph. DOK: 1 Identifies the graph of a circle given its equation in standard form, e.g., $(x - h)^2 + (y - k)^2 = r^2$. DOK: 1 Determines the radius and/or the coordinates of the center of a circle given its equation in standard form. DOK: 1 Max DOK: 1	Determines the equation of a circle given its radius or diameter and center not at the origin or given a diagram or graph where radius can be read from the diagram/graph. DOK: 1 Determines the equation of a circle given its center and its area or circumference. DOK: 2 Determines the equation of a circle given its center and a point on the circle. DOK: 2 Determines a point on the circle when the equation of the circle is not	Identifies the graph of a circle given its equation in non-standard form, e.g., $x^2 + y^2 + 2ax + 2by + c = 0$. DOK: 2 Determines the x- or y-coordinate of the center of a circle given the other coordinate, its radius or diameter, and a point on the circle. DOK: 2 Determines the radius and/or the coordinates of the center of a circle given its equation in non-standard form. DOK: 2 Max DOK: 2
HS.G.4 Logic and Proof: Students will use geometric definitions and theorems to reason abstractly and quantitatively.			
HS.G.4.a Know and use definitions to make deductions in mathematical argumentation (e.g., syllogism, detachment).	Identifies basic mathematical statements as being true or false. DOK: 1 Max DOK: 1	Identifies logical conclusions given a basic mathematical statement. DOK: 2 Max DOK: 2	Identifies logical conclusions given multiple basic mathematical statements. DOK: 2 Max DOK: 2
HS.G.4.b Evaluate the validity of conditional statements, including biconditional statements (e.g., conditional, converse, contrapositive, inverse).	Identifies the converse, contrapositive, or inverse statement when given a conditional statement or vice versa. DOK: 1 Max DOK: 1	Determines the validity of a conditional or biconditional statement. DOK: 2 Determines the validity of converse, contrapositive, inverse statements when given a conditional or biconditional statement. DOK: 2 Max DOK: 2	Explains the general validity of statements in relations to other types of conditional statements. (e.g. If a statement is true, will the contrapositive always be true?) DOK: 2 Max DOK: 2
HS.G.4.c Evaluate the validity of an argument communicated in different ways (e.g., a flow format, two-column, paragraph format).	Identifies an argument in one form when given in another form. DOK: 1 Max DOK: 1	Determines the validity of an argument. DOK: 2 Max DOK: 2	None at this level.
HS.G.4.d Use coordinate geometry to prove triangles are right, acute, obtuse, isosceles, equilateral, or scalene.	None at this level. Refer to 8.G.3.b-c for applying the Pythagorean Theorem to find side lengths of triangles, determines if a triangle is a right triangle, and to solve authentic problems.	Given coordinates that represent a triangle, determines whether the triangle is isosceles, equilateral, or scalene. DOK: 2 Max DOK: 2	Given coordinates that represent a triangle, determines whether the triangle is acute or obtuse. DOK: 2 Given that a triangle is isosceles, equilateral, or scalene, determines a third point given two points that make up the triangle. DOK: 2 Max DOK: 2

HS.G.4.e Prove and apply geometric properties and theorems regarding triangles, congruence, and similarity using deductive reasoning.	Identifies theorems related to triangles, congruent triangles, and similar triangles when used in isolation. DOK: 1 Max DOK: 1	Identifies multiple theorems in use when related triangles, congruent triangles, and similar triangles when used in isolation. DOK: 2 Completes a geometric proof related to triangles, congruent triangles, and similar triangles when given a partially completed proof. DOK: 2 Identifies the geometric proof related to triangles, congruent triangles, and similar triangles. DOK: 1 Max DOK: 2	Writes a geometric proof related to triangles, congruent triangles, and similar triangles. DOK: 2 Max DOK: 2
HS.G.4.f Prove and apply geometric theorems about quadrilaterals using deductive reasoning.	Identifies theorems related to quadrilaterals when used in isolation. DOK: 1 Max DOK: 1	Identifies multiple theorems in use when related quadrilaterals when used in isolation. DOK: 2 Completes a geometric proof related to quadrilaterals when given a partially completed proof. DOK: 2 Identifies the geometric proof related to quadrilaterals. DOK: 1 Max DOK: 2	Writes a geometric proof related to quadrilaterals. DOK: 2 Max DOK: 2
DATA: Students will solve problems and reason with data/probability using multiple representations, make connections within math and across disciplines, and communicate their ideas.			
HS.D.1 Data Collection and Statistical Methods: Students will formulate statistical investigative questions, collect data, and organize data.			
HS.D.1.a Formulate multi-variable statistical investigative questions and determine how data can be collected and analyzed to provide an answer.	Assessed at the local level		
HS.D.1.b Apply an appropriate data collection plan when collecting primary data for the statistical investigative question of interest.	Assessed at the local level		
HS.D.1.c Use appropriate technology, including spreadsheet-based logic, to organize data for analysis.	Assessed at the local level		
HS.D.1.d Distinguish between surveys, observational studies, and experiments.	Determines the definitions of randomized surveys, experiments, and observational studies. DOK: 1 Max DOK: 1	Distinguishes between surveys, randomized experiments, and observational studies in the context of a problem. DOK: 1 Max DOK: 1	Explain whether surveys, randomized experiments, or observational studies would be most appropriate in the context of a problem. DOK: 2 Max DOK: 2
HS.D.1.e Understand what constitutes good practice in designing a sample survey, an experiment, and an observational study.	None at this level.	Determines if a sample survey, an experiment, or an observational study is using good practice. DOK: 2 Identifies the best practice to use for a sample survey, an experiment, or an observational study. DOK: 2 Max DOK: 2	Explains why a certain step in a sample survey, an experiment, or an observational study is or is not good practice. DOK: 3 Determines what changes need to be made to a sample survey, an experiment, or an observational study to have it comply with good practices. DOK: 3 Max DOK: 3
HS.D.1.f Understand issues of bias and confounding variables in a study and their implications for interpretation.	Determines the definitions of populations, samples and random samples, bias in the context of data collection, and confounding variables. DOK: 1 Max DOK: 1	Determines examples of bias or confounding variables in the context of a problem. This may include determining ways to remove/minimize bias or reformulate questions. DOK: 2 Max DOK: 2	Justifies statements about bias within the context of data collection. DOK: 3 Justifies why a confounding variable explains a distorted relationship between two other variables. DOK: 3 Max DOK: 3

HS.D.2 Analyze Data and Interpret Results: Students will represent and analyze the data and interpret the results.			
HS.D.2.a Identify appropriate ways to summarize and then represent the distribution of univariate data and bivariate data through the construction of histograms, dot plots, stem plots, box plots, cumulative relative frequency graphs, time plots, circle graphs, stacked bar graphs, and mosaic bar graphs by hand or with technology.	Assessed at the local level		
HS.D.2.b Describe the shape, identify any outliers, and determine the spread of a data set.	Determines the best choice of spread for a data set based on which measure of center is selected (mean and standard deviations, median and interquartile range) and/or the existence of outliers. DOK: 2 Refer to 6.D.2.e for describing data shape and spread of data presented in box plots, histograms, stem-and-lead plots, line plots, and bar graphs. Refer to HS.D.2.d for interpreting normal distribution. Max DOK: 2	Identifies outliers of the data within the context of the problem. DOK: 2 Determines the interquartile range for a set of data. DOK: 2 Determines the standard deviation for a set of data. DOK: 2 Compares information between two sets of data involving interquartile range and/or standard deviation. DOK: 2 Max DOK: 2	None at this level.
HS.D.2.c Select and determine the appropriate measure of center based on the shape of a distribution and/or the presence of outliers.	None at this level. Refer to HS.D.2.b for determining standard deviation. Refer to HS.D.2.d for recognizing normal distributions.	Determines the appropriate measure of center based on the shape of a distribution and/or the presence of outliers. DOK: 2 Max DOK: 2	Explains why a given measure of center is or is not appropriate based on the shape of a distribution and/or the presence of outliers. DOK: 3 Max DOK: 3
HS.D.2.d Recognize when a data set can be reasonably said to be normally distributed and draw conclusions about the data from the associated normal distribution.	None at this level. Refer to HS.D.2.b for determining standard deviation.	Determines when a data set represents a normal distribution. DOK: 2 Max DOK: 2	Interprets data represented by a normal distribution, including using the standard deviation to draw conclusions and fit data. DOK: 2 Max DOK: 2
HS.D.2.e Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data and recognize possible associations and trends in the data.	Completes a partially filled in two-way frequency or relative frequency table summarizing data on two categorial variables collected from the same subjects. DOK: 1 Uses information from a frequency or relative frequency table to answer specific questions about the data. DOK: 1 Max DOK: 1	Constructs a frequency or relative frequency table to summarize data on two categorial variables collected from the same subjects. DOK: 2 Interprets frequency or relative frequency tables to describe possible associations between the two categorial variables that cannot be read directly from the table. DOK: 2 Max DOK: 2	Explains or justifies statements based on frequency or relative frequency tables on two categorical variables collected from the same subjects. DOK: 2 Max DOK: 2
HS.D.2.f Represent data on two quantitative variables on a scatter plot and describe how the variables are related.	None at this level. Refer to HS.D.2.g for making predictions from scatter plots involving lines of best fit/regression line. Refer to 8.D.2.d for making predictions given a line of best fit (equation or graph).	Determines the general trend of data that can be represented in scatter plots that follows linear, quadratic, or other non-linear patterns and answers questions based on that trend. DOK: 1 Identifies the scatter plot that represents a set of data and describe how the variables are related. DOK: 2 Max DOK: 2	Justifies statements about trends of non-linear data. DOK: 2 Max DOK: 2
HS.D.2.g Use technology to develop regression models for linear and non-linear data to predict unobserved outcomes. Interpret slope and y-intercept in the context of the problem.	None at this level. Refer to 8.D.2.d for making a prediction or interpreting a value using a given equation for the line of best fit or a graphed line of best fit.	Determines the rate of change or the linear equation to model data provided in a scatter plot. DOK: 2 Interprets slope and y-intercept that models the provided data in the context of the problem. DOK: 2 Makes predictions for unobserved outcomes using data that can be modeled by a linear or non-linear equation when the data is provided in a scatter plot and a curve can be determined from the scatterplot. The curve of best fit is not provided and the equation is not given. DOK: 2 Max DOK: 2	Makes predictions for unobserved outcomes using data that can be modeled by a linear or non-linear equation when only the data is provided in a table or set of ordered pairs. Requires using technology to determine the equation. DOK: 2 Max DOK: 2

HS.D.2.h Measure the strength of association using correlation coefficients for regression curves and interpret their meanings for the model.	Determines a likely correlation coefficient for a given set of data. (e.g., which scatter plot most likely has a correlation coefficient between -0.5 and -1?) DOK: 1 Max DOK: 1	Determines the strength of association using correlation coefficients for regression curves. DOK: 1 Interprets the meaning of the correlation coefficient based on the model. DOK: 2 Max DOK: 2	Explains the value of a correlation coefficient when given a scatter plot and the line of best fit. DOK: 2 Max DOK: 2
HS.D.2.i Use residuals and residual plots to judge the quality of a regression model.	Identifies the residual plot that corresponds to a line of best fit. DOK: 1 Max DOK: 1	Evaluates a linear model based on the residual plot. DOK: 2 Max DOK: 2	Explains how the residuals or a regression model are important or used in assessing the fit of a model. DOK: 2 Max DOK: 2
HS.D.2.j Recognize and explain when arguments based on data confuse correlation with causation.	Determines the definition of causation and correlation. DOK: 1 Max DOK: 1	Determines when causation or correlation exist within the context of a problem and distinguish between the two. DOK: 2 Max DOK: 2	Analyzes statements of causation within the context of a problem and the data. DOK: 2 Max DOK: 2
HS.D.2.k Understand what constitutes statistical significance. Interpret statistical significance in the context of a situation and answer investigative questions appropriately.	Determines if the difference between calculated parameters is significant without a context. DOK: 2 Max DOK: 2	Determines if the difference between calculated parameters is significant in the context of a situation. DOK: 2 Answers an investigative question using statistical significance. DOK: 2 Max DOK: 2	Explains the analysis of statistical significance in the context of a situation. DOK: 3 Max DOK: 3
HS.D.2.l Use probability as a tool for assessing risk and for informed decision making by interpreting P-values.	Identifies instances that do or do not closely match a null hypothesis given the p-value. DOK: 1 Max DOK: 1	Determines the risk in a situation given the p-values. DOK: 1 Max DOK: 1	Explains the meaning of a given p-value. DOK: 2 Max DOK: 2
HS.D.3 Probability: Students will interpret and apply concepts of probability.			
HS.D.3.a Describe events as subsets of a sample space using characteristics of the outcomes or as unions, intersections, or complements of other events.	Identifies the union, intersection, or compliments of sets given the sample space. DOK: 1 Max DOK: 1	Identifies subsets as being unions, intersections, or complements of other events. DOK: 1 Creates or identifies the union, intersection, or compliments of sets given context of an event. DOK: 2 Max DOK: 2	Creates or identifies event that requires a combination of two or more characteristics. Characteristics include the union, intersection, or compliments (Ex.(A B)∩C). DOK: 2 Max DOK: 2
HS.D.3.b Explain independent versus dependent probability of an event.	Identifies events as being independent or dependent. DOK: 1 Max DOK: 1	Explains the difference between an independent versus dependent event. DOK: 2 Max DOK: 2	None at this level.
HS.D.3.c Determine when order in counting matters and use permutations and combinations to compute probabilities of events accordingly.	Identifies situations where order matters in counting. DOK: 1 Max DOK: 1	Calculates the probabilities of events using combinations and permutations. DOK: 2 Counts the number of occurrences of an event using combinations and permutations. DOK: 2 Max DOK: 2	Explains why a combination or permutation should be used to calculate the probabilities of events. DOK: 2 Max DOK: 2
HS.D.3.d Determine whether or not events are mutually exclusive (disjoint) and calculate their probabilities in either case.	Identifies mutually exclusive events. DOK: 1 Max DOK: 1	Determines the probability of a mutually exclusive event. DOK: 2 Determines the probability of either mutually exclusive event occurring. DOK: 2 Determines whether or not events are mutually exclusive based on their probabilities. DOK: 2 Max DOK: 2	Explain why events are or are not mutually exclusive using given probabilities. DOK: 2 Max DOK: 2
HS.D.3.e Recognize and explain the concepts of conditional probability in everyday language and everyday situations.	Identifies or uses graphical representations that represent a situation that involves at least one conditional probability. DOK: 2 Max DOK: 2	Identifies concepts of conditional probability and independence in everyday language and everyday situations. DOK: 2 Max DOK: 2	Explains the concepts of conditional probability and independence in complex everyday language and everyday situations. DOK: 2 Max DOK: 2