Mathematics- Algebra 2
Units of Instruction
2022-2023

Mathematics - Algebra 2

UNIT 1: Functions	UNIT 2: Quadratics	UNIT 3: Matrices & Systems	UNIT 4: Polynomials	UNIT 5: Radicals & Rationals	UNIT 6: Exponentials & Logarithms	UNIT 7: Statistics & Probability
KY.HS.F.1c **KY.HS.F.8a** KY.HS.F.1 KY.HS.F.8 b **6 weeks** **3 weeks**	**KY.HS.A.19a** **KY.HS.F.1c** KY.HS.N.7 KY.HS.N.9 **6 weeks** **3 weeks**	**KY.HS.A.21** KY.HS.A.13 KY.HS.A.14 KY.HS.A.24 KY.HS.N.14 KY.HS.N.15 **5 weeks** **2.5 weeks**	**KY.HS.A.7** **KY.HS.F.1c** KY.HS.A.3a KY.HS.F.4 c KY.HS.F.6 b **6 weeks** **3 weeks**	**KY.HS.A.17b** **KY.HS.F.4b** KY.HS.F.1d KY.HS.A.17a **4 weeks** **2 weeks**	**KY.HS.F.1c** **KY.HS.F.4d** **KY.HS.F.10** KY.HS.A.1b KY.HS.A.2 KY.HS.A.12 KY.HS.A.15 KY.HS.F.3 KY.HS.F.9a KY.HS.F.13 **4 weeks** **2 weeks**	**KY.HS.SP.2** **KY.HS.SP.15a** KY.HS.SP.1 KY.HS.SP.3 KY.HS.SP.5 KY.HS.SP.9 KY.HS.SP.10 KY.HS.SP.11 KY.HS.SP.12 KY.HS.SP.13 KY.HS.SP.14 KY.HS.SP.15c KY.HS.SP.16 a,c,d KY.HS.SP.19 **5 weeks** **2.5 weeks**

Taught throughout year: KY.HS.N.5, KY.HS.N.6

Mathematics- Algebra 2

Unit 1: Functions

Mathematics - Algebra 2
Unit 1: Functions

Duration: 6 Weeks/ 3 Weeks

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Understand the concept of a function and use function notation. **KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.** **c. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.** MP.2, MP.4, MP.7	c. A function is often described and understood in terms of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions include, "For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?" Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity.
Cluster: Build new functions from existing functions.	a. Mastery of this standard includes recognizing even and odd functions from their graphs and algebraic

KY.HS.F.8 Understand the effects of transformations on the graph of a function. **a. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx) and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.** MP.3, MP.5	expressions.
Supporting Standards	
Standards	**Clarifications**
Cluster: Understand the concept of a function and use function notation. **KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.** **a. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x.** **b. Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context.** **d. Relate the domain of a function to its graph and, where applicable, to the quantitative**	a. When describing relationships between quantities, the defining characteristic of a function is the input value determines the output value or, equivalently, the output value depends upon the input value. In some situations where two quantities are related, each can be viewed as a function of the other. c. A function is often described and understood in terms of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions include, “For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?” Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity. e. Students compare characteristics from various

relationship it describes. **e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).** MP.2, MP.4, MP.7	representations for one type of family of function at a time. For quadratics, students might determine which function has the larger maximum when given two different representations of quadratic functions.
Cluster: Build new functions from existing functions. **KY.HS.F.8 Understand the effects of transformations on the graph of a function.** **b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.** MP.3, MP.5	

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Unit 2: Quadratics

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Unit 2: Quadratics

Duration: 6 Weeks/ 3 Weeks

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Solve equations and inequalities in one variable. **KY.HS.A.19 Solve quadratic equations in one variable.** **a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b.** MP.1, MP.8	Students observe that methods for solving quadratic equations are interrelated and certain situations may more appropriately call upon one method as opposed to the other methods.
Cluster: Understand the concept of a function	c. A function is often described and understood in terms

and use function notation. **KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.** **c. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.** MP.2, MP.4, MP.7	of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions include, "For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?" Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity.
Supporting Standards	
Standards	**Clarifications**
Cluster: Perform arithmetic operations with complex numbers. **KY.HS.N.7 Understanding properties of complex numbers.** **a. Know there is a complex number i such that i2 = –1 and every complex number has the form a + bi with a and b real.** **b. Use the relation i2 = –1 and the commutative, associative and distributive properties to add, subtract and multiply complex numbers.** MP.7, MP.8	a. Students understand that the complex number system provides solutions to the equation x^2 +1=0 and higher-degree equations.

Cluster: Use complex numbers in polynomial identities and equations. **KY.HS.N.9 Solve quadratic equations with real coefficients that have complex solutions.** MP.1, MP.2	Students use the Quadratic Formula to solve for complex solutions. Students recognize that when a quadratic equation yields complex solutions its graph does not cross the x-axis.

Mathematics- Algebra 2

Unit 3: Matrices and Systems

Mathematics - Algebra 2
Unit 3: Matrices and Systems

Duration: 5 Weeks/ 2.5 Weeks

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Solve systems of equations. **KY.HS.A.21 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.** MP.3, MP.6	Students utilize algebra techniques and graphical representations to determine points of intersection between lines and parabolas that indicate solution sets for a system of linear and quadratic equations.
Supporting Standards	
Standards	**Clarifications**

Cluster: Create equations that describe numbers or relationships. **KY.HS.A.13 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.** MP.2, MP.5	Students solve systems of equations with two or more variables to solve problems in the real world setting.
Cluster: Create equations that describe numbers or relationships. **KY.HS.A.14 Create a system of equations or inequalities to represent constraints within a modeling context. Interpret the solution(s) to the corresponding system as viable or nonviable options within the context.** MP.4, MP.5	Students may be asked to find an optimal solution and the conditions under which the optimal solution would occur for a given real world situation.
Cluster: Represent and solve equations and inequalities graphically. **KY.HS.A.24 Justify that the solutions of the equations f(x) = g(x) are the x-coordinates of the points where the graphs of y = f(x) and y = g(x) intersect. Find the approximate solutions graphically, using technology or tables. ★** MP.3, MP.5	Students justify solutions for equations which Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential and logarithmic functions. ★

Cluster: Perform operations on matrices and use matrices in applications. **KY.HS.N.14 Use matrices to represent and manipulate data.** MP.4, MP.5	Students understand matrices are rectangular arrays comprised of elements that are useful for solving problems in context.
Cluster: Perform operations on matrices and use matrices in applications. **KY.HS.N.15 Perform operations with matrices. a. Add, subtract and multiply matrices of appropriate dimensions. b. Multiply matrices by scalars to produce new matrices.** MP.7, MP.8	

Mathematics - Algebra 2

Unit 4: Polynomials

Mathematics - Algebra 2

Unit 4: Polynomials

Duration: 6 Weeks/ 3 Weeks

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Understand the relationship between zeros and factors of polynomials. **KY.HS.A.7 Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.** MP.2, MP.5, MP.7	Methods of finding roots could include, but are not limited to: · factoring · synthetic division · long division · an analysis of the graph (created by hand or through use of technology).
Cluster: Understand the concept of a function and use function notation.	c. A function is often described and understood in terms of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions

KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented. **c. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.** MP.2, MP.4, MP.7	include, "For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?" Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity.
Supporting Standards	
Standards	**Clarifications**
Cluster: Interpret functions that arise in applications in terms of the context. **KY.HS.F.3 Understand average rate of change of a function over an interval.** **a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval.** MP.2, MP.4	The rate of change over an interval is equivalent to the slope between the endpoints of the interval. For linear functions, the rate of change is constant, over all intervals. However, for nonlinear functions, the average rate of change may vary depending on the interval.
Cluster: Analyze functions using different representations. **KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★**	Within a family, the functions often have commonalities in the shapes of their graphs and in the kinds of features important for identifying and describing functions. This standard indicates the function families in students' repertoires, detailing which features are required for several key families. Students demonstrate fluency with linear, quadratic and exponential functions, including the ability to graph without using technology. In other

c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. MP.4, MP.5	function families, students graph simple cases without technology and more complex ones with technology.
Cluster: Build a function that models a relationship between two quantities. **KY.HS.F.6 Write a function that describes a relationship between two quantities. ★** **b. Combine standard function types using arithmetic operations.** MP.4, MP.7	b. Use real-world examples when appropriate.

Mathematics - Algebra 2

Unit 5: Radicals and Rationals

Mathematics - Algebra 2
Unit 5: Radicals and Rationals

Duration: 4 Weeks/2 Weeks

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Analyze functions using different representations. **KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★** **b. Graph square root, cube root and absolute value functions.** MP.4, MP.5	Within a family, the functions often have commonalities in the shapes of their graphs and in the kinds of features important for identifying and describing functions. This standard indicates the function families in students' repertoires, detailing which features are required for several key families. Students demonstrate fluency with linear, quadratic and exponential functions, including the ability to graph without using technology. In other function families, students graph simple cases without technology and more complex ones with technology.
Cluster: Understand solving equations as a process of reasoning and explain the reasoning. **KY.HS.A.17 Solve and justify equations in one**	Students analyze solution sets of equations to determine processes (for example, squaring both sides of an equation) that might lead to a solution set that differs from the original equation.

variable. Justify the solutions and give examples showing how extraneous solutions may arise. **a. Solve rational equations written as proportions in one variable.** **b. Solve radical equations in one variable. MP.3,** MP.5, MP.7	
Supporting Standards	
Standards	**Clarifications**
Cluster: Understand the concept of a function and use function notation. **KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.** **d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.** MP.2, MP.4, MP.7	
Cluster: Understand solving equations as a process of reasoning and explain the reasoning. **KY.HS.A.17 Solve and justify equations in one variable. Justify the solutions and give examples showing how extraneous solutions may arise.** **a. Solve rational equations written as proportions in one variable.**	Students analyze solution sets of equations to determine processes (for example, squaring both sides of an equation) that might lead to a solution set that differs from the original equation.

MP.3, MP.5, MP.7	

Mathematics - Algebra 2

Unit 6: Exponentials and Logarithms

Mathematics - Algebra 2
Unit 6: Exponentials and Logarithms

Duration: 4 Weeks/ 2 Week

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Understand the concept of a function and use function notation. **KY.HS.F.1 Understand properties and key features of functions and the different ways functions can be represented.** **c. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.** MP.2, MP.4, MP.7	c. A function is often described and understood in terms of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions include, “For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?” Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity.

Cluster: Analyze functions using different representations. **KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★** **d. Graph exponential and logarithmic functions, showing intercepts and end behavior.** MP.4, MP.5	Within a family, the functions often have commonalities in the shapes of their graphs and in the kinds of features important for identifying and describing functions. This standard indicates the function families in students' repertoires, detailing which features are required for several key families. Students demonstrate fluency with linear, quadratic and exponential functions, including the ability to graph without using technology. In other function families, students graph simple cases without technology and more complex ones with technology.
Cluster: Build new functions from existing functions. **KY.HS.F.10 Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents with the use of technology.** MP.1, MP.7	Students can use inverses of simple logarithmic and exponential equations in order to solve those equations. The inverse relationship between logarithmic and exponential functions is special in that each function's inverse is also a function
Supporting Standards	
Standards	**Clarifications**
Cluster: Interpret the structure of expressions. **KY.HS.A.1 Interpret expressions that represent a quantity in terms of its context. ★** **b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.**	Students encounter simpler scenarios where they interpret $r \cdot t$ as the product of a given rate and time or interpret the perimeter expression (2l+2w) contextually as the sum of twice the length and twice the width of a rectangle. Students encounter more complicated scenarios where they interpret P(1+r)n contextually as the product of a principal investment, P and (1+r)n which represents an investment rate, compounding factor and time.

MP.2, MP.6	
Cluster: Interpret the structure of expressions. **KY.HS.A.2 Use the structure of an expression to identify ways to rewrite it and consistently look for opportunities to rewrite expressions in equivalent forms.** MP.7, MP.8	Students see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares factored as (x^2 – y^2)(x^2 + y^2). Additionally, students see there are three commonly used forms for a quadratic expression: • Standard form • Factored form • Vertex form and can identify when one form might be more useful than another.
Cluster: Create equations that describe numbers or relationships. **KY.HS.A.12 Create equations and inequalities in one variable and use them to solve problems.** MP.1, MP.4	Students use the addition, subtraction, multiplication and division properties for both equations and inequalities to solve problems. These equations may arise from linear and quadratic functions and simple rational and exponential functions.
Cluster: Create equations that describe numbers or relationships. **KY.HS.A.15 Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.** MP.2, MP.7	Students encounter scenarios where they rewrite formulas/equations for variables different from the commonly used formulas. An example may include, but not being limited to, students rearranging Ohm's law (V = IR) to highlight resistance R, rather than the variable for voltage V.
Cluster: Interpret functions that arise in applications in terms of the context.	The rate of change over an interval is equivalent to the slope between the endpoints of the interval. For linear

KY.HS.F.3 Understand average rate of change of a function over an interval. **a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval.** **b. Estimate the rate of change from a graph. ★** MP.2, MP.4	functions, the rate of change is constant, over all intervals. However, for nonlinear functions, the average rate of change may vary depending on the interval.
Cluster: Build new functions from existing functions. **KY.HS.F.9 Find inverse functions.** **a. Given the equation of an invertible function, find the inverse.** **MP.2, MP.6**	a. Students can complete the process of finding the inverse when given an equation of a function that is invertible.
Cluster: Construct and compare linear, quadratic and exponential models and solve problems. **KY.HS.F.13 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.** MP.7, MP.8	Students compare functions by focusing on how the output values change over intervals of equal length. Even though a linear function may initially be increasing faster than an exponential function, an increasing exponential function always eventually exceeds an increasing linear function.

Mathematics - Algebra 2

Unit 7: Statistics and Probability

Mathematics - Algebra 2
Unit 7: Statistics and Probability

Duration: 5 Weeks/ 2.5 Week

Standards for Mathematical Practice	
MP.1. Make sense of problems and persevere in solving them. MP.2. Reason abstractly and quantitatively. MP.3. Construct viable arguments and critique the reasoning of others. MP.4. Model with mathematics.	MP.5. Use appropriate tools strategically. MP.6. Attend to precision. MP.7. Look for and make use of structure. MP.8. Look for and express regularity in repeated reasoning.
Priority Standards	
Standards	**Clarifications**
Cluster: Understand independence and conditional probability and use them to interpret data. **KY.HS.SP.15 Understand the concept of independence.** **a. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their individual probabilities, P(A) x P(B)** MP.1, MP.6	a. Events A and B are independent if and only if P(A and B) = P(A)P(B).

Cluster: Summarize, represent and interpret data on a single count or measurement variable. **KY.HS.SP.2 Use statistics appropriate to the shape of the numerical data distribution to compare center (median, mean) and spread (interquartile range when comparing medians and standard deviation when comparing means) of different data distributions.** MP.2, MP.6	Students use raw data and data from appropriate graphical representations to compare differences in the shape, center, spread and presence of outliers and other unusual features of comparable data sets.
Supporting Standards	
Standards	**Clarifications**
Cluster: Summarize, represent and interpret data on a single count or measurement variable. **KY.HS.SP.1 Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).** MP.4, MP.5	Students create appropriate graphical representations to compare differences in the shape, center, spread and presence of outliers and other unusual features of comparable data sets.
Cluster: Summarize, represent and interpret data on a single count or measurement variable. **KY.HS.SP.3 Interpret differences in shape, center and spread in the context of the distributions of the numerical data, accounting for the presence and possible effects of extreme data points**	Students analyze contextual situations as they interpret differences in the shape, center, spread and presence of outliers and other unusual features of comparable data sets.

(outliers). MP.1, MP.7	
Cluster: Summarize, represent and interpret data on two categorical and quantitative variables. **KY.HS.SP.5 Summarize categorical data for two or more categories in frequency tables. Calculate and interpret joint, marginal and conditional relative frequencies (probabilities) in the context of the data, recognizing possible associations and trends in the data.** MP.2, MP.7	Students use frequency tables to both calculate probabilities, as well as determine relationships between the variables represented in those tables.
Cluster: Understand and evaluate random processes underlying statistical experiments. **KY.HS.SP.9 Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.** MP.1, MP.3	Students use sample statistics (mean and standard deviation) obtained from random samples to help estimate population parameters which are unknown values.
Cluster: Understand and evaluate random processes underlying statistical experiments. **KY.HS.SP.10 Decide if a specified model is consistent with the results from a simulation.**	If a model shows a spinning coin falls heads-up with probability of 0.5, would a result of 5 tails in a row cause you to question the model?

MP.3, MP.6	
Cluster: Make inferences and justify conclusions from sample surveys, experiments and observational studies. **KY.HS.SP.11 Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.** MP.3, MP.8	Students understand a random selection of 100 students from your school will allow you to draw some conclusions about all the students in the school, whereas taking your class as a sample will not allow that generalization. Students recognize experiments involve imposing treatments on units/subjects, whereas observational studies do not.
Cluster: Make inferences and justify conclusions from sample surveys, experiments and observational studies. **KY.HS.SP.12 Use data from a sample survey to estimate a population mean or proportion and explain how bias may be involved in the process.** MP.4, MP.7	KY.HS.SP.12 differs from KY.HS.SP.9 in that results from non-random samples (Voluntary Response and Convenience) generate biased results when compared with more appropriate, random samples of the same population.
Cluster: Make inferences and justify conclusions from sample surveys, experiments and observational studies. **KY.HS.SP.13 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between estimates or statistics are significant.**	Hypotheses can be tested to determine if significant differences between two treatments exist using statistical data. If significance exists, claims and conclusions can be made about the treatment.

MP.3, MP.8	
Cluster: Understand independence and conditional probability and use them to interpret data. **KY.HS.SP.14 Describe events as subsets of a sample space. Use characteristics (or categories) of the outcomes, such as,** **• as unions, "A or B," that are mutually exclusive events and** **• as unions, "A or B," that are non-mutually exclusive events and** **• as intersections, "A and B," and** **• as complements of other events, "not A."** **to calculate basic probabilities.** MP.1, MP.2	A union of two events "A or B" includes all elements in both events notated by: $A \cup B$. Addition Rule for mutually exclusive events: If A and B are mutually exclusive, P(A or B) = P(A) + P(B). Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B) and interpret the answer in terms of the model. An intersection, "A and B," of two events includes all overlapping elements notated by: $A \cap B$. A complement for any event A, P(not A) = 1 – P(A).
Cluster: Understand independence and conditional probability and use them to interpret data. **KY.HS.SP.15 Understand the concept of independence.** **c. Recognize and explain the concept of independence in** **everyday language and everyday situations.** MP.1, MP.6	

Cluster: Understand independence and conditional probability and use them to interpret data. **KY.HS.SP.16 Understand the concept of conditional probability.** **a. Understand the conditional probability of A given B as P(A andB)/P(B).** **c. Recognize and explain the concept of conditional probability in everyday language and everyday situations.** **d. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model.** MP.1, MP.3	a. For any two events *A* and *B*, P(*A* given *B*) = $\frac{P(A \text{ and } B)}{P(B)}$.
Cluster: Use the rules of probability to compute probabilities of compound events **KY.HS.SP.19 Use permutations and combinations to compute probabilities.** **a. Distinguish between situations that can be modeled using counting techniques, including Fundamental Counting Principle, permutations and combinations.** **b. Perform calculations using the appropriate counting technique, including simple probabilities.** MP.1, MP.8	