High School Mathematics Matrix
Standards by Course 2019-2020

The purpose of this document is to provide guidance for educators working to align the Kentucky Academic Standards for Mathematics to the content offered within certain high school courses. This document is not intended to be a substitute for the *Kentucky Academic Standards for Mathematics* document found at https://kystandards.org/content_area/math/. The *Kentucky Academic Standards for Mathematics* document has supports embedded, such as Clarifications, Coherence/Vertical Alignment and information to support educators in offering students opportunities to simultaneously engage with the Standards for Mathematical Practice and the content standards. While not specifically addressed within this document, schools/districts offering an Integrated Mathematics sequence should attend to any standards indicated as being a part of Algebra 1 or Geometry by the time students have completed Integrated Mathematics 2. Additionally, there is no guidance provided in this document for local curriculum decision-making on how the “Additional Required Standards” will be addressed.

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
KY.HS.N.1 Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents.	✓			
KY.HS.N.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	✓			
KY.HS.N.3 (+) Justify why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.				
KY.HS.N.4 Use units in context as a way to understand problems and to guide the solution of multi-step problems; ★ a. Choose and interpret units consistently in formulas; b. Choose and interpret the scale and the origin in graphs and data displays.	✓ a, b			
KY.HS.N.5 Define appropriate units in context for the purpose of descriptive modeling. ★	✓	✓	✓	Across all courses
KY.HS.N.6 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★	✓	✓	✓	Across all courses
KY.HS.N.7 Understanding properties of complex numbers. a. Know there is a complex number i such that $i^2 = -1$ and every complex number has the form a + bi with a and b real. b. Use the relation $i^2 = -1$ and the commutative, associative and distributive properties to add, subtract and multiply complex numbers. c. (+) Find the conjugate of a complex number and use it to find the quotient of complex numbers.			✓ a, b	

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
KY.HS.N.8 (+) Understanding representations of complex numbers using the complex plane. a. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers) and explain why the rectangular and polar forms of a given complex number represent the same number. b. Represent addition, subtraction, multiplication, modulus and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. c. Calculate the distance between numbers in the complex plane as the modulus of the difference and the midpoint of a segment as the average of the numbers at its endpoints.				
KY.HS.N.9 Solve quadratic equations with real coefficients that have complex solutions.			✓	
KY.HS.N.10 (+) Extend polynomial identities to the complex numbers.				
KY.HS.N.11 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.				
KY.HS.N.12 (+) Understand and apply properties of vectors. a. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments and use appropriate symbols for vectors and their magnitudes. b. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. c. Solve problems involving velocity and other quantities that can be represented by vectors.				
KY.HS.N.13 (+) Perform operations with vectors (addition, subtraction and multiplication by a scalar). a. Add vectors end-to-end, component-wise and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. c. Understand vector subtraction $v - w$ as $v + (-w)$, where $-w$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order and perform vector subtraction component-wise. d. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise. e. b. Compute the magnitude of a scalar multiple cv using $\|\|cv\|\| = \|c\|v$. Compute the direction of cv knowing that when $\|c\|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).				
KY.HS.N.14 Use matrices to represent and manipulate data.			✓	
KY.HS.N.15 Perform operations with matrices.			✓	

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
a. Add, subtract and multiply matrices of appropriate dimensions. b. Multiply matrices by scalars to produce new matrices.			a, b	
KY.HS.N.16 (+) Understand properties of square and identity matrices. a. Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties. b. Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse. c. Work with 2×2 matrices as transformations of the plane and interpret the absolute value of the determinant in terms of area.				
KY.HS.N.17 (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.				
KY.HS.A.1 interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity.	✔ a, b		✔ b	Algebra 1 focuses on linear, quadratic, and exponential 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.	✔		✔	
KY.HS.A.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. ★ a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term. b. Factor a quadratic expression to reveal the zeros of the function it defines. c. Use the properties of exponents to rewrite exponential expressions. d. (+) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	✔ a, b, c		✔ a	
KY.HS.A.4 (+) Derive the formula for the sum of a finite geometric series (when the common ratio is not 1) and use the formula to solve problems. ★				
KY.HS.A.5 Add, subtract and multiply polynomials.	✔			

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
KY.HS.A.6 (+) Know and apply the Remainder Theorem.				
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.	✓		✓	Algebra 1 focuses on 1st and 2nd degree polynomials.
KY.HS.A.8 (+) Prove polynomial identities and use them to describe numerical relationships.				
KY.HS.A.9 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.				
KY.HS.A.10 (+) Rewrite simple rational expressions in different forms.				
KY.HS.A.11 (+) Add, subtract, multiply and divide rational algebraic expressions.				
KY.HS.A.12 Create equations and inequalities in one variable and use them to solve problems.	✓		✓	Algebra 1 focuses on linear, quadratic, and exponential equations and inequalities.
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.	✓		✓	Algebra 1 focuses on linear, quadratic, and exponential equations.
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.	✓		✓	Algebra 1 focuses on linear systems of equations or inequalities.

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KY.HS.A.15 Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations.	✓		✓	Algebra 1 focuses on first degree formulas.
KY.HS.A.16 Understand each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	✓			
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. b. Solve radical equations in one variable.			✓ a, b	Including equations involving rational exponents
KY.HS.A.18 Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.	✓			
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. b. (+) Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p) 2 = q that has the same solutions. Derive the quadratic formula from this form. c. (+) Solve quadratic equations by completing the square.	✓ a		✓ a	Algebra 1 focuses on part a, but only the first sentence.
KY.HS.A.20 Solve systems of linear equations in two variables. a. Understand a system of two equations in two variables has the same solution as a new system formed by replacing one of the original equations with an equivalent equation. b. Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.	✓ a, b			
KY.HS.A.21 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.			✓	
KY.HS.A.22 (+) Use matrices to solve a system of equations. a. Represent a system of linear equations as a single matrix equation in a vector variable. b. Find the inverse of a matrix if it exists. c. Use matrices to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).				

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KY.HS.A.23 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.	✓			
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. ★	✓		✓	Algebra 1 focuses on linear systems.
KY.HS.A.25 Graph linear inequalities in two variables. a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict inequality). b. Graph the solution set to a system of linear inequalities as the intersection of the corresponding half-planes.	✓ a, b			
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. 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. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	✓ a, b, c, d, e		✓ c, d, e	Algebra 1 focuses on linear, quadratic, and exponential functions.
KY.HS.F.2 Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domain is a subset of the integers	✓			
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. ★	✓ a, b		✓ a, b	Algebra 1 focuses on linear, quadratic, and exponential functions.
KY.HS.F.4 Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). ★ a. Graph linear and quadratic functions and show intercepts, maxima and minima. b. Graph square root, cube root and absolute value functions.	✓ a		✓ b, c, d	

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
c. Graph polynomial functions, identifying zeros when suitable factorizations are available and showing end behavior. d. Graph exponential and logarithmic functions, showing intercepts and end behavior. e. (+) Graph trigonometric functions, showing period, midline and amplitude. f. (+) Graph piecewise functions, including step functions. g. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available and showing end behavior.				
KY.HS.F.5 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function. b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay.	✓ a, b			
KY.HS.F.6 Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. c. (+) Compose functions.	✓ a, b		✓ b	Algebra 1 focuses on linear functions.
KY.HS.F.7 Use arithmetic and geometric sequences to model situations and scenarios. a. Use formulas (explicit and recursive) to generate terms for arithmetic and geometric sequences. b. Write formulas to model arithmetic and geometric sequences and apply those formulas in realistic situations. ★ c. (+) Translate between recursive and explicit formulas.	✓ a, b			
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. b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.			✓ a, b	
KY.HS.F.9 Find inverse functions. a. Given the equation of an invertible function, find the inverse. b. (+) Verify by composition that one function is the inverse of another. c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. d. (+) Produce an invertible function from a non-invertible function by restricting the domain.			✓ a	
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.			✓	

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KY.HS.F.11 Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Recognize and justify that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	✓ a, b, c			
KY.HS.F.12 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	✓			
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.	✓		✓	Algebra 1 focuses on observing graphs and tables that increase in linear, quadratic, or exponential patterns.
KY.HS.F.14 Interpret the parameters in a linear or exponential function in terms of a context.	✓			
KY.HS.F.15 (+) Understand the relationship of radian measure of an angle to its arc length.				
KY.HS.F.16 (+) Understand and use the unit circle. a. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. b. Use special triangles to determine geometrically the values of sine, cosine, tangent for π/3, π /4 and π /6 and use the unit circle to express the values of sine, cosine and tangent for π –x, π +x and 2 π –x in terms of their values for x, where x is any real number. c. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.				
KY.HS.F.17 (+) Choose trigonometric functions to model periodic phenomena with specified period, midline and amplitude. ★				
KY.HS.F.18 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.				
KY.HS.F.19 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions				

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using technology and interpret them in terms of the context. ★				
KY.HS.F.20 (+) Proving identities and formulas within the context of trigonometry. a. Prove the Pythagorean identity and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle. b. Prove the addition and subtraction formulas for sine, cosine and tangent and use them to solve problems				
KY.HS.G.1 Know and apply precise definitions of the language of Geometry: a. Understand properties of line segments, angles and circle. b. Understand properties of and differences between perpendicular and parallel lines.		✓ a, b		
KY.HS.G.2 Representing transformations in the plane. a. Describe transformations as functions that take points in the plane as inputs and give other points as outputs b. Compare transformations that preserve distance and angle measures to those that do not. c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.		✓ a, b, c		
KY.HS.G.3 (+) Develop formal definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments				
KY.HS.G.4 Understand the effects of transformations of geometric figures. a. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure. b. Specify a sequence of transformations that will carry a given figure onto another. c. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.		✓ a, b, c		
KY.HS.G.5 Know and apply the concepts of triangle congruence: a. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.		✓ a, b		
KY.HS.G.6 Apply theorems for lines, angles, triangles, parallelograms.		✓		
KY.HS.G.7 Prove theorems about geometric figures. a. Construct formal proofs to justify theorems for lines, angles and triangles. b. (+) Construct formal proofs to justify theorems for parallelograms.		✓ a		

Kentucky Academic Standards for Mathematics	Algebra 1	Geometry	Additional Required Standards	Content Note
KY.HS.G.8 Create and apply geometric constructions. a. Make formal geometric constructions with a variety of tools and methods. b. Apply basic construction procedures to construct more complex figures.		✓ a, b		
KY.HS.G.9 Understand properties of dilations. a. Verify the properties that result from that dilations given by a center and a scale factor. b. Verify that a dilation produces an image that is similar to the pre-image.		✓ a, b		
KY.HS.G.10 Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.		✓		
KY.HS.G.11 Understand theorems about triangles. a. Apply theorems about triangles. b. (+) Prove theorems about triangles. c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.		✓ a, c		
KY.HS.G.12 Understand properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine and tangent). b. Explain and use the relationship between the sine and cosine of complementary angles. c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★		✓ a, b, c		
KY.HS.G.13 (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.				
KY.HS.G.14 (+) Understand and apply the Law of Sines and the Law of Cosines. a. Use the Law of Sines and Cosines to find unknown measurements in right and non-right triangles. b. Prove the Laws of Sines and Cosines and use them to solve problems.				
KY.HS.G.15 Verify using dilations that all circles are similar.		✓		
KY.HS.G.16 Identify and describe relationships among angles and segments within the context of circles involving: a. Recognize differences between and properties of inscribed, central and circumscribed angles. b. Understand relationships between inscribed angles and the diameter of a circle. c. Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.		✓ a, b		
KY.HS.G.17 (+) Apply basic construction procedures within the context of a circle.				

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a. Construct the inscribed and circumscribed circles of a triangle. b. Construct a tangent line from a point outside a given circle to the circle.				
KY.HS.G.18 (+) Understand the relationship between an intercepted arc length within a circle and the radius of the circle. a. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector. b. Define the radian measure of the angle as the measure of a central angle that intercepts an arc equal in length to the radius of the circle.				
KY.HS.G.19 Understand the relationship between the algebraic form and the geometric representation of a circle. a. Write the equation of a circle of given center and radius using the Pythagorean Theorem. b. (+) Derive and write the equation of a circle of given center and radius using the Pythagorean Theorem. c. (+) Complete the square to find the center and radius of a circle given by an equation.		✓ a		
KY.HS.G.20 (+) Derive the equations of conic sections. a. Derive the equation of a parabola given a focus and directrix. b. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.				
KY.HS.G.21 Use coordinates to justify and prove simple geometric theorems algebraically.		✓		
KY.HS.G.22 Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.		✓		
KY.HS.G.23 Find measurements among points within the coordinate plane. a. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment. b. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.		✓ a, b		
KY.HS.G.24 Use coordinates within the coordinate plane to calculate measurements of two dimensional figures. a. Compute the perimeters of various polygons. b. Compute the areas of triangles, rectangles and other quadrilaterals.★		✓ a, b		
KY.HS.G.25 Analyze and determine the validity of arguments for the formulas for the various figures and shapes. a. Finding the circumference and area of a circle. b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.		✓ a, b		

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KY.HS.G.26 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.				
KY.HS.G.27 Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms ★		✓		
KY.HS.G.28 Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.		✓		
KY.HS.G.29 Use geometric shapes, their measures and their properties to describe objects in real world settings.		✓		
KY.HS.G.30 Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.		✓		
KY.HS.G.31 Apply geometric methods to solve design problems. ★		✓		
KY.HS.SP.1 Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots).			✓	
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.			✓	
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 (outliers).			✓	
KY.HS.SP.4 (+) When appropriate, fit a normal distribution to a numerical data set for given mean and standard deviation and then estimate population percentages using the Empirical Rule and recognize that there are data sets for which such a procedure is not appropriate.				
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.			✓	
KY.HS.SP.6 Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating and/or analyzing	✓ a, b			

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residuals).				
KY.HS.SP.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	✓			
KY.HS.SP.8 Understand the role and purpose of correlation in linear regression. a. Use technology to compute correlation coefficient of a linear fit. b. Interpret the meaning of the correlation within the context of the data. c. Describe the limitations of correlation when establishing causation.	✓ a, b, c			
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.			✓	
KY.HS.SP.10 Decide if a specified model is consistent with the results from a simulation.			✓	
KY.HS.SP.11 Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.			✓	
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.			✓	
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.			✓	
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.			✓	
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) b. (+) Determine whether two events are independent and provide a justification to support the decision. c. Recognize and explain the concept of independence in everyday language and everyday situations.			✓ a, c	
KY.HS.SP.16 Understand the concept of conditional probability. a. Understand the conditional probability of A given B as P(A and B)/P(B). b. (+) Interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability			✓ a, c, d	

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of A and the conditional probability of B given A is the same as the probability of 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.				
KY.HS.SP.17 (+) Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide whether events are independent and to approximate conditional probabilities.				
KY.HS.SP.18 (+) Apply the General Multiplication Rule, P(A and B) = P(A)P(B|A) = P(B)P(A|B), in a uniform probability model and interpret the answer in terms of the model.				
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. c. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.			✓ a, b	
KY.HS.SP.20 (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same appropriate graphical displays as for data distributions.				
KY.HS.SP.21 (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution and use the value in analyzing decisions.				
KY.HS.SP.22 (+) Develop a probability distribution for a random variable. a. Find an expected value based on a sample space in which theoretical probabilities can be calculated. b. Find an expected value based on a sample space in which empirical probabilities can be calculated.				
KY.HS.SP.23 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. a. Find the expected payoff for a game of chance. b. Evaluate and compare strategies on the basis of expected values. c. Use calculated expected values to make fair decisions and formulate strategies.				