

Adair County High School

2020-2021

9-12 MATH STANDARDS - Conceptual Category-Statistics and Probability / PACING GUIDE

5 Key Skills

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Statistics and Probability - Interpreting Categorical and Quantitative Data

Cluster: Summarize, represent and interpret data on a single count or measurement variable

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.1 (MP.4, MP.5) Represent the distribution of data with plots on the real number line (stem plots, dot plots, histograms and box plots)	Represent the distribution of data with plots on the real number line.	Unit - Probability & Statistics	Distribution Stem plot Dot plots Histograms Box plots	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.2 (MP.2, MP.6) 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.	Use statistics appropriate to the shape of the numerical data distribution to compare median, mean, interquartile range of different data distributions.	Unit - Probability & Statistics	Distribution Mean Median Interquartile range Standard deviation Distribution	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.3 (MP.1, MP.7) 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).	Interpret differences in shape, center, and spread in the context of distributions of the numerical data and accounting for outliers.	Unit - Probability & Statistics	Distribution Shape Center Spread Outliers Extreme data points	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.4 (+) (MP.1, MP.3) When appropriate, fit a normal	Fit a normal distribution to a numerical data set	Unit - Probability & Statistics	Normal distribution Mean	KUTA All Things Algebra - Probability & Statistics	

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.	for a 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.		Standard deviation Population Empirical rule Data set	Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus
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Statistics and Probability - Interpreting Categorical and Quantitative Data
Cluster: Summarize, represent and interpret data on two categorical and quantitative variables

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.5 (MP.2, MP.7) 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.	Summarize categorical data for two or more categories in frequency tables. Calculate and interpret joint, marginal and conditional relative frequencies in a context of the data, recognizing possible associations and trends in the data.	Unit - Probability & Statistics	Relative frequency Frequency table Marginal Conditional probabilities	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.6 Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. (MP.3, MP.4, MP.5)					
a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context.	Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context.	Unit - Probability & Statistics	Model Scatter plot Linear/quadratic/exponential model	KUTA All Things Algebra - Probability & Statistics, Linear Equations Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
b. Informally assess the fit of a model (through calculating correlation for linear data, plotting,	Informally assess the fit of a model.	Unit - Probability & Statistics	Line of best fit Correlation residuals	KUTA All Things Algebra - Probability & Statistics, Linear Equations	Algebra II

calculating and/or analyzing residuals)				Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus
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Statistics and Probability - Interpreting Categorical and Quantitative Data

Cluster: Interpret linear models

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.7 (MP.1, MP.2) Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle	Unit - Probability & Statistics	Slope Rate of change Intercept Constant Term Linear model	KUTA All Things Algebra - Linear Equations Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.8 Understand the role and purpose of correlation in linear regression. (MP.5, MP.6)					
a. Use technology to compute correlation coefficient of a linear fit.	use technology to compute correlation coefficient of a linear fit.	Unit - Probability & Statistics	Correlation coefficient Linear fit	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
b. Interpret the meaning of the correlation within the context of the data.	Interpret the meaning of the correlation within the context of the data.	Unit - Probability & Statistics	Correlation	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
c. Describe the limitations of correlation when establishing causation.	Describe the limitations of correlation when establishing causation.	Unit - Probability & Statistics	Causation Correlation	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences,	Algebra I

				Series, and Probability	Pre-Calculus
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Statistics and Probability - Making Inferences and Justifying Conclusions

Cluster: Understand and evaluate random processes underlying statistical experiments

Standard	Learning Target We are learning to.....	Windows of instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.9 (MP.1, MP.3) Understand statistics as a process for making inferences and justifying conclusions about population parameters based on a random sample from that population.	Understand statistics as a process for making inferences and justifying conclusions	Unit - Probability & Statistics	Inferences Population parameters Sample Standard deviation mean	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.10 (MP.3, MP.6) Decide if a specified model is consistent with the results from a simulation.	Decide if a specified model is consistent with the results from a simulation.	Unit - Probability & Statistics	Simulation	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus

Statistics and Probability - Making Inferences and Justifying Conclusions

Cluster: Make inferences and justify conclusions from sample surveys, experiments and observational studies

Standard	Learning Target We are learning to.....	Windows of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.11 (MP.3, MP.8) Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization	Recognize the purposes of and differences among sample surveys, experiments and	Unit - Probability & Statistics	Sample survey Experiment Observational studies random	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I

relates to each.	observational studies. Explain how randomization relates to sample surveys, experiments, and observational studies.				Pre-Calculus
KY.HS.SP.12 (MP.4, MP.7) Use data from a sample survey to estimate a population mean or proportion and explain how bias may be involved in the process.	Explain how bias may be involved in estimating a population mean or proportion.	Unit - Probability & Statistics	Sample survey Population mean Proportion biased	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra I Pre-Calculus
KY.HS.SP.13 (MP.3, MP.8) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between estimates or statistics are significant.	Use data from randomized experiments to compare two treatments. Use simulations to decide if differences between estimates or statistics are significant.	Unit - Probability & Statistics	Experiment Simulation Estimate Statistics	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus

Statistics and Probability - Conditional Probability and the Rules of Probability
Cluster: [Understand independence and conditional probability and use them to interpret data](#)

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.14 (MP.1, MP.2) Describe events as subsets of a sample space. Use characteristics (or categories) of the outcomes, such as, <ul style="list-style-type: none"> ● 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, “ 	Describe events as subsets of a sample space and calculate basic probabilities.	Unit - Probability & Statistics	Sample space Event Outcome Union Mutually exclusive Intersection Complement	KUTA All Things Algebra - Probability & Statistics KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra II Pre-Calculus

<ul style="list-style-type: none"> and As complements of other events, "not A." <p>To calculate basic probabilities</p>					
KY.HS.SP.15 Understand the concept of independence. (MP.1, MP.6)					
<p>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, $P(A) \times P(B)$</p>	Define independent events.	Unit - Probability & Statistics	Event Independent	<p>KUTA All Things Algebra - Probability & Statistics</p> <p>KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Algebra II</p> <p>Pre-Calculus</p>
<p>b. (+) Determine whether two events are independent and provide a justification to support the decision</p>	Determine whether two events are independent and provide a justification to support the decision	Unit - Probability & Statistics	Independent dependent	<p>KUTA All Things Algebra - Probability & Statistics</p> <p>KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Algebra II</p> <p>Pre-Calculus</p>
<p>c. Recognize and explain the concept of independent in everyday language and everyday situations</p>	Recognize and explain the concept of independent in everyday language and everyday situations	Unit - Probability & Statistics	Independent dependent	<p>KUTA All Things Algebra - Probability & Statistics</p> <p>KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Algebra II</p> <p>Pre-Calculus</p>
KY.HS.SP.16 Understand the concept of conditional probability. (MP.1, MP.3)					
<p>a. Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$.</p>	Understand conditional probability.	Unit - Probability & Statistics	Conditional probability	<p>KUTA All Things Algebra - Probability & Statistics</p>	<p>Algebra II</p>
<p>b. (+) Interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A and the conditional probability of B given A is the same as the probability of B.</p>	Interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A and the	Unit - Probability & Statistics	Conditional probability independent	<p>KUTA All Things Algebra - Probability & Statistics</p>	<p>Algebra II</p>

	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.	Recognize and explain the concept of conditional probability in everyday language and everyday situations.	Unit - Probability & Statistics	Conditional probability	KUTA All Things Algebra - Probability & Statistics	Algebra II
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.	Find the conditional probability of A given B.	Unit - Probability & Statistics	Conditional probability outcome	KUTA All Things Algebra - Probability & Statistics	Algebra II
KY.HS.SP.17 (+) (MP.2, MP.4) 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.	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use two-way tables as a sample space to decide whether events are independent and to approximate conditional probabilities.		Frequency table Sample space Event Independent Conditional probability	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	N/A

Statistics and Probability - Conditional Probability and the Rules of Probability
Cluster: [Use the rules of probability to compute probabilities of compound events](#)

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.18 (+) (MP.1, MP.2) Apply the General Multiplication Rule, $P(\text{And } B) = P(A)P(B A) = P(B)P(A B)$, in a uniform probability model and interpret the answer in terms of the model.	Apply the General Multiplication Rule in a uniform probability model.		General multiplication rule	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	N/A

KY.HS.SP.19 (MP.1, MP.8) Use permutations and combinations to compute probabilities.	Use permutations and combinations to compute probabilities.	Unit - Probability & Statistics	Permutation Combination	KUTA All Things Algebra - Probability & Statistics	Algebra II
a. Distinguish between situations that can be modeled using counting techniques, including Fundamental Counting Principle, permutations and combinations.	Distinguish between situations that can be modeled using the Fundamental Counting Principle, permutations and combinations.	Unit - Probability & Statistics	Fundamental counting principle Permutation Combination	KUTA All Things Algebra - Probability & Statistics KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra II Pre-Calculus
b. Perform calculations using the appropriate counting technique, including simple probabilities.	Perform calculations using the appropriate counting technique.	Unit - Probability & Statistics	Counting technique	KUTA All Things Algebra - Probability & Statistics KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra II Pre-Calculus
c. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	Use permutations and combinations to compute probabilities of compound events and solve problems.	Unit - Probability & Statistics	Permutation Combination Compound event	KUTA All Things Algebra - Probability & Statistics KUTA Software Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Algebra II Pre-Calculus

Statistics and Probability - Using Probability to Make Decisions
Cluster: [Calculate expected values and use them to solve problems](#)

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.20 (+) (MP.3, MP.6) 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	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	Unit - Probability & Statistics	Random Sample space Probability distribution	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus

appropriate graphical displays as for data distributions.	appropriate graphical displays as for data distributions.				
KY.HS.SP.21 (+) (MP.1, MP.8) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution and use the value in analyzing decisions.	Calculate the expected value of a random variable; and interpret it as the mean of the probability distribution and use the value in analyzing decisions.	Unit - Probability & Statistics	Random variable Mean Probability distribution	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus
KY.HS.SP.22 (+) Develop a probability distribution for a random variable.(MP.2, MP.8)					
a. Find an expected value based on a sample space in which theoretical probabilities can be calculated.	Find an expected value based on a sample space in which theoretical probabilities can be calculated.	Unit - Probability & Statistics	Expected value Sample space Theoretical probability	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus
b. Find an expected value based on a sample space in which empirical probabilities can be calculated.	Find an expected value based on a sample space in which empirical probabilities can be calculated.	Unit - Probability & Statistics	Expected value Sample space Empirical probability	KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability	Pre-Calculus

Statistics and Probability - Using Probability to Make Decisions

Cluster: Use probability to evaluate outcomes of decision

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary	Resources	Course Name
KY.HS.SP.23 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values. (MP.6, MP.8)					

<p>a. Find the expected payoff for a game of chance.</p>	<p>Find the expected payoff for a game of chance</p>	<p>Unit - Probability & Statistics</p>	<p>Chance</p>	<p>KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Pre-Calculus</p>
<p>b. Evaluate and compare strategies on the basis of expected values.</p>	<p>Evaluate and compare strategies on the basis of expected values.</p>	<p>Unit - Probability & Statistics</p>	<p>Expected value</p>	<p>KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Pre-Calculus</p>
<p>c. Use calculated expected values to make fair decisions and formulate strategies.</p>	<p>Use calculated expected values to make fair decisions and formulate strategies.</p>	<p>Unit - Probability & Statistics</p>	<p>Expected value</p>	<p>KUTA All Things Algebra - Probability & Statistics Pre Calculus/Larson and Hostetler Unit Sequences, Series, and Probability</p>	<p>Pre-Calculus</p>