

Statistics and Probability: Pre-Algebra

Stage 1 Desired Results		
ESTABLISHED GOALS: <i>Competencies:</i> <i>Students will demonstrate the ability to simplify numeric and algebraic expressions by applying the properties of operations and the arithmetic of real numbers.</i> <i>Students will demonstrate the ability to apply probability models in order to determine the likelihood of an event.</i> <i>Students will demonstrate the ability to apply statistical methods in order to make inferences and predictions.</i> <i>Students will demonstrate the ability to model real world problems by building and analyzing the appropriate expression, equation, or function.</i> <i>Students will demonstrate the ability to apply statistical methods in order to analyze and summarize bi-variate data.</i> <i>Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials.</i> <i>Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences.</i> <i>Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style.</i> Content Standards: 7.SP.A.1 - Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. 7.SP.A.2 - Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. 7.SP.B.3 - Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between centers by expressing it as a multiple of a measure of variability. 7.SP.B.4 - Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. 7.SP.C.5 - Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. 8.SP.A.4 - Understand that patterns of association can also be seen in bi-variate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	Transfer Students will be able to independently use their learning to analyze and describe patterns between quantities to make accurate predictions, valid conclusions, and informed decisions based on data.	
	Meaning ENDURING UNDERSTANDINGS Students will understand that... - it is necessary to assess the validity of a sample before drawing conclusions or making inferences. - the likelihood of an event can be predicted with both theoretical and experimental probability, however one methodology may be more preferable dependent upon the situation. - patterns of association can be generalized and used for decision making and processing information. ESSENTIAL QUESTIONS - What is fair? - How do you evaluate the reasonableness of your results? - What are relationships and how do they affect decision making?	
	Acquisition Students will know... - the difference between a population and a sample. - that measures of center and variability can be used to compare populations. - that simple random sampling allows us to compare and make inferences about populations. - the difference between theoretical and experimental probability. - that a sample space can be created using tables, organized lists, simulations, and tree diagrams. - that a sample space can be used to find theoretical probability. - that probability of a chance event is always between 0 and 1 inclusive. - that two-way tables show data that pertains to two different categories. - that a two-way table can organize information from two different categories to identify and describe any association between the two categories - statistical data describes relationships and helps us to make decisions. Students will be skilled at... - making valid inferences about populations. - comparing populations based on random samples. - identifying bias in data to determine validity. - determining which measure of central tendency should be used to represent a given set of data. - using measures of center and variability to make inferences, predictions, and informed decisions. - comparing two data sets using measures of center and measures of variation. - informally assessing the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between centers by expressing it as a multiple of a measure of variability. - generating samples that are representative of the population. - creating lists, diagrams, simulations, and tables to model all possible outcomes to determine the probability of simple and compound events. - distinguishing between and comparing theoretical and experimental probability. - calculating the theoretical and experimental	

For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores? 7.SP.C.6 - Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. 7.SP.C.7 - Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. - Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. - Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. 7.SP.C.8 - Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. - Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. - Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. - Design and use a simulation to generate frequencies for compound events. - MP1 Make sense of problems and persevere in solving them. - MP2 Reason abstractly and quantitatively. - MP3 Construct viable arguments and critique the reasoning of others. - MP6 Attend to precision. - MP7 Look for and make use of structure. - MP8 Look for and express regularity in repeated reasoning.	vocabulary: <i>biased, unbiased, simple random sample, sample, population, inference, prediction, measures of variability, comparative inferences, box and whisker graph/box plot, chance processes, relative frequency, relative, frequency, two-way table, categorical data, frequency, outliers.</i>	<i>probability of simple and compound events.</i> <i>developing and using probability models to find the likelihood of events.</i> <i>collecting bi-variate categorical data and constructing a two-way table to summarize the data.</i> <i>calculating frequencies from a two-way table to describe associations between two variables.</i> <i>interpreting patterns of association in bi-variate categorical data from a two-way table.</i>
Content Area Literacy Standards	21st Century Skills	
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. - RST.6-8.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. - RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually. - RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. - RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	<i>reason effectively</i> <i>use systems thinking</i> <i>make judgments and decisions</i> <i>solve problems</i> <i>access and evaluate information</i> <i>use and manage information</i>	

Stage 2 - Evidence	
Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S):

	OTHER EVIDENCE:
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Stage 3 – Learning Plan <i>Summary of Key Learning Events and Instruction</i>	
<i>Language Arts Integration</i>	<i>Mathematics Integration</i>
1.OA.1 Use	1.OA.1 Use
<i>Technology Integration</i>	<i>District Materials</i>
1.OA.1 Use	