

Probability, Statistics & Trigonometry: Probability

Stage 1 Desired Results		
ESTABLISHED GOALS: Competencies: - Students will demonstrate perseverance and strategic thinking by identifying the underlying meaning of a problem, planning a logical solution pathway, working through challenges, and verifying the reasonableness of their answers. - Students will demonstrate the ability to decontextualize (represent symbols) and contextualize (understand the meaning of quantities) by converting real-world situations into mathematical symbols for manipulation, and interpreting symbolic results back into practical contexts. - Students will demonstrate logical thinking and communication skills by building justified mathematical arguments, comprehending the justification of others, and critiquing their reasoning. - Students will demonstrate application skills by using mathematical concepts and symbols to represent, analyze, and solve problems arising in everyday life, society, and the workplace. - Students will demonstrate resourcefulness by evaluating and selecting the most effective tools to solve mathematical problems and deepen their understanding of concepts. - Students will demonstrate accuracy and clarity using correct mathematical terminology, specifying units of measure, and calculating with the degree of precision appropriate for the problem context. - Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials. - 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. - Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style. Content Standards: - HSS.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. - HSS.CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. - HSS.CP.A.3 Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and 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. - HSS.CP.A.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 if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. - HSS.CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung	Transfer	
	Students will be able to independently use their learning to construct and defend a well thought out prediction.	
	Meaning	
	ENDURING UNDERSTANDINGS Students will understand that... the probability of an event's occurrence can be predicted with varying degrees of confidence.	ESSENTIAL QUESTIONS How confident can you be that a given outcome will occur?
	Acquisition	
	Students will know... - the formulas for mean, standard deviation and variance of a binomial distribution. - the formula for maximum and minimum usual values. <u>vocabulary:</u> event, sample space, classical approach to probability, relative frequency approximation of probability, subjective probability, complement, actual odds against, actual odds in favor, payoff odds, compound event, mutually exclusive, rule of complementary events, independent events, dependent events, fundamental counting rule, factorial, permutation, combination, random variable, probability distribution, discrete, continuous, binomial probability distribution, Poisson distribution, normal distribution, density curve, standard normal distribution, nonstandard normal distribution, central limit theorem	Students will be skilled at... - finding probability using the classical approach - determining if an event is unusual. - estimating probability using the relative frequency approach. - listing all possible outcomes. - determining if events are mutually exclusive. - finding the probability of the complement of an event. - using addition rule for mutually exclusive and non-mutually exclusive events. - classifying events as independent or dependent. - using multiplication rule for independent events. - using addition rule for mutually exclusive events. - describing the complement of a given event. - finding the probability of "at least one". - using contingency tables to find conditional probability. - evaluating factorials, permutations, and combinations. - finding and using a number of combinations and permutations. - classifying random variables as discrete or continuous. - determining whether a probability distribution is described.

cancer. • HSS.CP.B.6 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. • HSS.CP.B.7 Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model. • HSS.CP.B.8 (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model. • HSS.CP.B.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems. • 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. • MP4 Model with mathematics. • MP7 Look for and make use of structure. • MP8 Look for and express regularity in repeated reasoning.		• <i>finding the mean, standard deviation, and variance of a probability distribution.</i> • <i>finding expected value.</i> • <i>determining if a procedure results in a binomial distribution.</i> • <i>finding the probability of exactly x successes</i> • <i>finding the probability of at least/at most x successes.</i> • <i>finding the mean, standard deviation, and variance for a binomial distribution.</i> • <i>finding probability for continuous uniform distributions.</i> • <i>finding probability for standard normal distributions given z-score(s).</i> • <i>using z-score to compare relative position.</i> • <i>finding the percentile corresponding to a given value.</i> • <i>finding z-score for standard normal distributions given probability (area) and determine if it is unusual.</i> • <i>finding probability for nonstandard normal distributions.</i> • <i>finding the number of observations satisfying a given condition.</i> • <i>finding values for a normal distribution given probabilities or percentages.</i>
Content Area Literacy Standards	21st Century Skills	
• RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. • RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11-12 texts and topics</i>. • RST.11-12.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. • RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. • RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. • RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	• <i>reason effectively</i> • <i>use systems thinking</i> • <i>make judgments and decisions</i> • <i>solve problems</i> • <i>communicate clearly</i>	

Stage 2 - Evidence	
<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan	
Summary of Key Learning Events and Instruction	
<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	