



Statistical Reasoning UNIT PLANNER



Unit title	Unit 5 Random Variables	Unit duration	10 days
Essential Questions (OR GUIDING QUESTIONS?)			
<p>How do we verify that the probability distribution of a discrete random variable is valid?</p> <p>What are the steps to calculate probabilities involving a discrete random variable?</p> <p>Why would we classify a random variable as discrete or continuous?</p> <p>What are the steps to make a histogram to display the probability distribution of a discrete random variable?</p> <p>How do we calculate and interpret the mean (expected value) of a discrete random variable?</p> <p>How do we calculate and interpret the standard deviation of a discrete random variable?</p> <p>How do we determine whether a given scenario is a binomial setting?</p> <p>What are the steps to calculate probabilities involving a single value of a binomial random variable?</p> <p>What are the components in a histogram to display a binomial distribution?</p> <p>How do we calculate and interpret the mean and standard deviation of a binomial distribution?</p> <p>What are the steps to show that the probability distribution of a continuous random variable is valid?</p> <p>How do we determine the relative locations of the mean and median of a continuous random variable from the shape of its probability distribution?</p> <p>When is it appropriate to draw a normal probability distribution with a given mean and standard deviation?</p> <p>What is the Empirical Rule (68–95–99.7 rule) and how is it used to find approximate probabilities in a normal distribution?</p> <p>How do we use Table A (z-score chart) to find a probability (area) from a z-score in the standard normal distribution?</p> <p>How do we use Table A (z-score chart) to find a z-score from a probability (area) in the standard normal distribution?</p> <p>How do we calculate the probability that a value falls within a given interval in a normal distribution?</p> <p>What are the steps to find a value corresponding to a given probability (area) in a normal distribution?</p>			
Assessments			
Common Formative Assessment – Quiz 1 (section 5.1-5.4), Quiz 2 (section 5.5-5.7)			
Common Summative Assessment – Unit 5 Test			
Content Standards			

Students will interpret results and make connections to the original question.

MSR.IR.1 Students will ask if the difference between two sample proportions or two sample means is due to random variation or if the difference is significant.

- a. Students will be able to determine if there are differences between two population parameters or treatment effects.
 - i. Using simulation, determine the appropriate model to decide if there is a difference between two population parameters.
 - ii. Using simulation, determine the appropriate model to decide if there is a difference between two treatment effects.

Students will design and implement a plan to collect the appropriate data to answer the statistical question.

MSR.CD.2 Students will understand that randomness should be incorporated into a sampling or experimental procedure.

- a. Students will be able to implement a reasonable random method for selecting a sample or for assigning treatments in an experiment.
 - i. Implement a simple random sample.
 - ii. Randomly assign treatments to experimental subjects or objects.

MSR.CD.4 Students will distinguish between the role of randomness and the role of sample size with respect to using a statistic from a sample to estimate a population parameter.

- a. Students will be able to distinguish the roles of randomization and sample size with designing studies.
 - i. Recognize that randomization reduces bias where bias occurs when certain outcomes are systematically more likely to appear.
 - ii. Recognize that random selection from a population plays a different role than random assignment in an experiment.
 - iii. Recognize that sample size impacts the precision with which estimates of the population parameters can be made (larger the sample size the more precision).

Learning Activities and Experiences

Topic	Resource	Content Covered	Standards Addressed
Random Variables	5-1 Two Types of Random Variables Statistics and Probability with Applications pg. 332 – 338	<ul style="list-style-type: none"> • Verify that the probability distribution of a discrete random variable is valid. • Calculate probabilities involving a discrete random variable. • Classify a random variable as discrete or continuous. 	MSR.CD.2 MSR.CD.4
	5-2 Analyzing Discrete Random Variables Statistics and Probability with Applications pg. 338 – 347	<ul style="list-style-type: none"> • Make a histogram to display the probability distribution of a discrete random variable and describe its shape. • Calculate and interpret the mean (expected value) of a discrete random variable. • Calculate and interpret the standard deviation of a discrete random variable. 	MSR.CD.2 MSR.CD.4
	5-3 Binomial Random Variables Statistics and Probability with Applications pg. 348 – 355	<ul style="list-style-type: none"> • Determine whether or not a given scenario is a binomial setting. • Calculate probabilities involving a single value of a binomial random variable. • Make a histogram to display a binomial distribution and describe its shape. 	MSR.CD.4
	5-4 Analyzing Binomial Random Variables Statistics and Probability with Applications pg. 356 – 364	<ul style="list-style-type: none"> • Calculate and interpret the mean and standard deviation of a binomial distribution. • Find probabilities involving several values of a binomial random variable. • Use technology to calculate cumulative binomial probabilities. 	MSR.CD.4

	<p>5-5 Continuous Random Variables Statistics and Probability with Applications pg. 365 – 374</p>	<ul style="list-style-type: none"> • Show that the probability distribution of a continuous random variable is valid and use the distribution to calculate probabilities. • Determine the relative locations of the mean and median of a continuous random variable from the shape of its probability distribution. • Draw a normal probability distribution with a given mean and standard deviation. 	MSR.CD.4
	Additional Resources:		
Normal Distributions	<p>5.6 The Standard Normal Distribution Statistics and Probability with Applications pg. 375 – 383</p> <p>Standard Deviation of a Discrete Random Variable Calculation Table - https://marietta.schoology.com/template/5584806230</p> <p>Ch 5 Activity - Smelling Parkinson's Disease - https://marietta.schoology.com/template/3427533812</p>	<ul style="list-style-type: none"> • Use the 68 – 95 – 99.7 rule to find approximate probabilities in a normal distribution. • Use the Standard Normal Probabilities Table to find a probability (area) from a z-score in the standard normal distribution. • Use the Standard Normal Probabilities Table to find a z-score from a probability (area) in the standard normal distribution. 	MSR.IR.1 MSR.CD.2 MSR.CD.4
	<p>5.7 Normal Distribution Calculations Statistics and Probability with Applications pg. 384 – 392</p>	<ul style="list-style-type: none"> • Calculate the probability that a value falls within a given interval in a normal distribution. • Find a value corresponding to a given probability (area) in a normal distribution. 	MSR.IR.1 MSR.CD.2 MSR.CD.4
	https://marietta.schoology.com/template/5584807322		
	Additional Resources:		
Personalized Learning and Differentiation			
<p>Teachers differentiate by providing examples (work samples or task-specific clarifications of assessment criteria); structuring support (advance organizers, flexible grouping, peer relationships); establishing flexible deadlines, and adjusting the pace.</p> <p>-SWD/504- Accommodations provided -ELL- Five Principle ELL Curriculum Framework and Vocabulary Supports -Intervention Support- Re-teaching Activities in Small Groups with Progress Monitoring -Extensions- Enrichment Tasks and Projects</p>			
Resources			
<p>Statistics and Probability with Applications (High School) 3rd Ed. PLC Schoology Resources - https://marietta.schoology.com/group/1985294869/materials#/group/1985294869/materials?f=83203540</p>			