Statistics CP Unit 5: Probability Distributions

Unit #:	APSDO-00019150	Duration:	3.0 Week(s)	Date(s):	

Team:
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Grades:
11, 12
Subjects:
Mathematics

Unit Focus

In this unit, students will discuss random variables and important probability distributions associated with discrete random variables. They will calculate binomial, geometric, and Poisson distributions to calculate real world probabilities. In addition, students will create a graphical display of probability distributions to make help make conclusions. Summative assessments may include projects, labs, and tests. Primary instructional resources include Understanding Statistics 9th Edition, Houghton/Mifflin, 2009 and Against All Odds: Inside Statistics video series.

Stage 1: Desired Results - Key Understandings

Established Goals

Common Core
Mathematics: 11

- 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 graphical displays as for data distributions. *CCSS.MATH.CONTENT.HSS.MD.A.1*
- Find the expected payoff for a game of chance. *CCSS.MATH.CONTENT.HSS.MD.B.5.A*
- Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

Transfer

T1 (T50) Based on an understanding of any problem, initiate a plan, execute it and evaluate the reasonableness of the solution.
T2 (T53) Articulate how mathematical concepts relate to one another in the context of a problem or in the theoretical sense.
T3 (T51) Examine alternate methods to accurately and efficiently solve problems.
T4 (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.
T5 (T32) Apply appropriate formulas to determine the unknown.
T6 (T30) Describe, classify, and compare objects.

Meaning

Understandings	Essential Questions
U1 (U511) Placing a problem in a category gives you a familiar approach to solving it.	**Q1** (Q511) What characteristics/attributes define this type of problem?

CCSS.MATH.CONTENT.HSS.MD.A.2 • Evaluate and compare strategies on the basis of expected values. *CCSS.MATH.CONTENT.HSS.MD.B.5.B* • Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *CCSS.MATH.CONTENT.HSS.MD.A.3* • Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *CCSS.MATH.CONTENT.HSS.MD.A.4* • Look for and make use of structure. *CCSS.MATH.MP.7* • Model with mathematics. *CCSS.MATH.MP.4* • Reason abstractly and quantitatively. *CCSS.MATH.MP.2*	**U2** (U560) Patterns and structures are characterized by consistent relationships. **U3** (U306) All generalizations from data must be compared to random behavior to determine causation.	**Q2** (Q510) What type(s) of problem is this? **Q3** (Q560) What is the pattern/structure in this problem? **Q4** (Q304) What patterns do I see in this data set? Could this be random behavior? (Gr 6-12) **Q5** (Q303) How do I effectively organize and display data?
	Acquisition of Knowledge and Skill	
	Knowledge	**Skills**
		S1 Distinguish between discrete and continuous random variables **S2** Graph probability distributions **S3** Calculate the expected value and standard deviation of a probability distribution **S4** Determine the defining features of a binomial, geometric, or Poisson probability distribution **S5** Compute binomial, geometric, and Poisson probabilities **S6** Compute mean and standard deviation for binomial and geometric distributions **S7**

		Compute the minimum number of trials needed to achieve a given probability of success

Stage 3: Learning Plan

Coding	Code	Description of Learning Activity