Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Mathematics	Course:	AP Statistics	Unit 3 Title:	Anticipating Patterns	Grade Level(s):	10-12
Assessed Trimester:	Trimester A/B	Pacing:	25-32 Days	Date Created:	1/29/2014	Last Revision Date:	6/25/2014

Course Understandings: Students will understand that:

E. Exploring categorical data helps explain association between variables.

J. Probability is the basis for inference.

K. Combining independent random variables has rules which help them see the relationships between the variables.

L. The normal distribution is the most common distribution and helps them to determine probabilities of many events.

- M. Knowing about sampling distributions and their properties help them to draw conclusions based on inference procedures.
- O. Tests of significance help them to draw conclusions about a population.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Minnesota State/Local/Technology Standard(s) addressed (2007):

• Standard (9.4.3.#):

Benchmark:

9.4.3.1 Select and apply counting procedures, such as the multiplication and addition principles and tree diagrams, to determine the size of a sample space (the number of possible outcomes) and to calculate probabilities.

9.4.3.2 Calculate experimental probabilities by performing simulations or experiments involving a probability model and using relative frequencies of outcomes. 9.4.3.3 Understand that the Law of Large Numbers expresses a relationship between the probabilities in a probability model and the experimental probabilities found by performing simulations or experiments involving the model.

9.4.3.4 Use random numbers generated by a calculator or a spreadsheet, or taken from a table, to perform probability simulations and to introduce fairness into decision making.

9.4.3.5 Apply probability concepts such as intersections, unions and complements of events, and conditional probability and independence, to calculate probabilities and solve problems. 9.4.3.6 Describe the concepts of intersections, unions and complements using Venn diagrams. Understand the relationships between these concepts and the words AND, OR, NOT, as used in computerized searches and spreadsheets.

9.4.3.7 Understand and use simple probability formulas involving intersections, unions and complements of events.

9.4.3.8 Apply probability concepts to real-world situations to make informed decisions.

9.4.3.9 Use the relationship between conditional probabilities and relative frequencies in contingency tables.

AP CollegeBoard

III. Anticipating Patterns: Exploring random phenomena using probability and simulation (20%–30%)

Probability is the tool used for anticipating what the distribution of data should look like under a given model.

- a. Students will understand that probability is the basis for inference.
- **b.** Students will understand that combining independent random variables has rules which help us to see the relationships between the variables.

c. Students will understand that the normal distribution is the most common distribution and helps us to determine probabilities of many events.

d. Students will understand that knowing about sampling distributions and their properties help us to draw conclusions based on inference procedures.

ACT Testing					
ACT7 Determine the probability of a simple event ACT8 Exhibit knowledge of simple counting techniques* ACT9 Compute straightforward probabilities for common situations ACT10 Use Venn diagrams in counting* ACT11 Calculate the average, given the frequency counts of all the data values ACT12 Calculate or use a weighted average ACT13 Apply counting techniques ACT14 Compute a probability when the event and/or sample space are not given or obvious ACT15 Exhibit knowledge of conditional and joint probability					
Tra	nsfer				
 Students will be able to independently use their learning to: (product, high order reasoning) Using probability as a tool for anticipating distributions of data through real world models. Stock Market investment, as gambling on a favorable game. 					
Меа	Meaning				
Unit Understanding(s): Students will understand that: • Probability is the tool used for anticipating what the distribution of data should look like under a given model. Random phenomena are not haphazard: they display an order that emerges only in the long run and is described by a distribution. The mathematical description of variation is central to statistics. The probability required for statistical inference is not primarily axiomatic or combinatorial but is oriented toward using probability distributions to describe data.	Essential Q Students will keep considering: • What is a normal distribution? • How does the normal distribution apply to the rea • What does probability mean? • How can we base decisions on chance? • What is a random variable? • What is a sample distribution? • How do sampling distributions relate to populatio • How can modeling be used to predict the future? • To what extent does our world exhibit binomial and				
Αϲϥι	uisition				
 Knowledge - Students will: Understand the multiplication principle Recognize that random phenomena can be investigated by means of a carefully designed simulation Explain the relationship between x and m as the sample size increases Understand the need for randomization Define random behavior Define and understand intersections, unions, complements, conditional probability and independence The formulas for P(A and B) and P(A or B) Define mutually exclusive Venn Diagrams Understand unions and intersections to determine simple probabilities Understand disjoint, complementary and independent Recognize if data was collected appropriately Identify conditional probabilities 	 Reasoning - Students will: Predict sample space Organize and interpret appropriate steps to carry Judge the accuracy of x compared to m Interpret random numbers to perform probability s Distinguish between these probability concepts Distinguish between independence and depender Recognize mutually exclusive events Analyze events as disjoint, complementary or ind Understand limits of prediction Make decisions using probability Distinguish between conditional and independent Evaluate different types of data in order to determ probability model. 				

Question(s):

I world?

on distributions?

nd geometric phenomena?

y out a simulation

simulations

ence

dependent

nt probabilities mine the correct probability allocation to develop a

 Understand the "Law of Large Numbers" and interpretation of long-run relative frequency Explain the addition rule, multiplication rule, conditional probability, and independence Describe the concepts of intersection (joint), unions, and complements using venn diagrams Understand the relationships between AND, OR, NOT Understand and use simple probability formulas involving intersections, unions and complements of events Understand discrete random variables versus continuous random variables Understanding the use of tree diagrams and counting techniques (combinations, permutations) to determine sample space Recognize binomial and geometric distributions Explain simulations of random behavior and probability distributions 	 Skills - Students will: Use tree diagrams to predict sample space and d Use appropriate diagrams to predict probability Demonstrate their understanding of probability rule Construct tree diagrams to organize the use of the with several stages Carry out a simulation to measure real-world prob Use random number generators on a calculator or Carry out labeling a sample space for randomizati Calculate probability problems Use Venn diagrams to solve real-life probability problems Use Venn diagrams to picture relationships amon Construct Venn diagrams to calculate probabilitie Calculate probabilities using a 2-way (contingency) Carry out mean (expected value), standard deviati variables Perform a probability calculations that relate to real- Demonstrate the rules for means and standard de random variables. Demonstrate how to perform normal probability calculation calculate probability calculates

Common Misunderstandings	Essential new vocabulary
 Students do not understand the difference between independent and mutually exclusive. 	Binomial Distribution
Independence cannot be shown with a diagram.	Complement
• Students incorrectly believe that they can find the exact probability of an exact event in a continuous	Conditional Probability
probability distribution.	Expected Value (mean)
• Students do not understand that when combining two random variables, you cannot add standard	Geometric Distribution
deviations.	Independence
• Students do not understand the difference between a probability distribution function (pdf) calculation	Law of Large Numbers
and a cummulative distribution function (cdf) calcuation	 Mutually Exclusive (Disjoint)
 Students don't provide enough detail when describing a simulation process. 	Relative Frequency
	Probability Simulations

determine sample size

ules to apply to real world situations ne multiplication and addition rules to solve problems

bability outcomes or a spreadsheet ation

s, complements, conditional probability and

problems ing several events es cy) table ations, and perform linear transformations of random

m digit table or calculator Il-word situations to make informed decisions. Ieviations for sums and differences of independent

calculations to solve real-world situations.