Unit G - *Probability*

Overview

This brief unit introduces students to probability. It begins by arranging information from sets into Venn Diagrams. Then the Venn Diagrams are used to determine probabilities. Next, some geometric probabilities related to length and area are explored. Finally, the fundamental counting principle is covered and applied to permutations and combinations.

21st Century Capacities: Analyzing

Stage 1 - Desired Results

ESTABLISHED GOALS/ STANDARDS

MP 1 Make sense of problems and persevere in solving them
MP5 Use appropriate tools strategically
MP8 Look for and express regularity in repeated reasoning

Understand independence and conditional probability and use them to interpret data

CCSS.MATH.CONTENT.HSS.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

CCSS.MATH.CONTENT.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.

Transfer:

Students will be able to independently use their learning in new situations to...

1. Represent and interpret patterns in numbers, data and objects.
2. Demonstrate fluency with math facts, computation and concepts.
3. Use appropriate tools to make reaching solutions more efficient, accessible and accurate. (analyzing)

Meaning:

UNDERSTANDINGS: *Students will understand that:*

1. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.
2. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.
3. Mathematicians examine relationships to discern a pattern, generalizations, or structure.
4. Mathematicians understand that placing a problem in a category gives one a familiar approach to solving it.

ESSENTIAL QUESTIONS: *Students will explore & address these recurring questions:*

A. Does this solution make sense?
B. What methods can I use to monitor my thinking/accuracy?
C. What math tools/models/strategies can I use to solve the problem?
D. What is the most efficient way to solve this problem?

CCSS.MATH.CONTENT.HSS.CP.A.3 Understand the conditional probability of *A* given *B* as *P*(*A* 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*. CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.HSS.CP.A.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. **Use the rules of probability to compute probabilities of compound events.** CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.HSS.CP.B.7 Apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model. CCSS.MATH.CONTENT.HSS.CP.B.8 (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the	***Acquisition:***	
	Students will know… 1. Data can be organized in sets and Venn Diagrams to make observations easier 2. Probability is the ratio of success to total possibilities 3. The total number of outcomes for several events is the product of the outcomes for each individual event (fundamental counting principle) 4. If order of events matters, then the problem is a permutation 5. If the order of events doesn't matter, then the problem is a combination 6. Vocabulary: set, union, intersection, complement, Venn Diagram, probability, fundamental counting principle, permutation, combination	*Students will be skilled at…* 1. Determining unions, intersections and complements of sets 2. Arranging data into Venn Diagrams 3. Determining probabilities from Venn Diagrams 4. Determining geometric probabilities based on length and area 5. Finding the total number of possible outcomes for multiple events 6. Calculating permutations and combinations

answer in terms of the model. CCSS.MATH.CONTENT.HSS.CP.B.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems. CCSS.MATH.CONTENT.HSS.MD.A.1 (+) 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.2 (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution. CCSS.MATH.CONTENT.HSS.MD.A.3 (+) 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.4 (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.		