Gold Seal Lesson

Author(s): *Marsha Kucker*			*Lesson Title:* *It's Probable That…*			
Grade Span			*ICLE Application Model*			
K-4	*5-8 x*	*9-12*	*A*	*B*	*C*	*D x*

Instructional Focus:

Listening –
Students listen for a variety of purposes appropriate to the grade level.

Speaking –
Students speak for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

Number Operation and Concepts –
Students use number, number sense, and number relationships in a problem-solving situation. Students communicate the reasoning used in solving these problems.

Algebraic Concepts and Relationships –
Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation. Students evaluate and communicate the reasoning used in solving these problems.

Statistics and Probability –
Students use statistics and probability to analyze given situations and the results of experiments. Students communicate the reasoning used in arriving at a conclusion.

Problem Solving and Mathematical Reasoning –
Students apply a variety of problem-solving strategies to investigate and solve problems from across the curriculum as well as from practical applications.

Performance Task

This activity is a lesson in probability. You will need one pair of dice for every 2 students.

1. Divide the class into teams of two. Give each team one pair of dice.

2. Tell each team to number a sheet of paper from 1 to 100. Have them roll the dice 100 times, recording the total after each roll.

3. Periodically stop the class and ask them "What is the probability that you will roll a one on a die?" The answer is 1 in 6. Then ask the class to compute the probability of rolling two 1's at a time. The answer is 1 in 36 (1/6 x 1/6 = 1/36). Repeat this exercise periodically using different examples, such as what would be the odds of rolling four consecutive 6's? (1/6 x 1/6 x 1/6 x 1/6 = 1 in 1296)

4. At the end of 100 rolls, have each group add the number of each combination rolled from 2 to 12.

5. Create a chart adding all of the group combinations from 2 to 12. How close are the totals? Discuss with the class that if all of the dice were built equally, the percentage variances of the occurrences would eventually diminish with the more rolls made.

ICLE Essential Skills

Problem Solving and Mathematical Reasoning – Students apply a variety of problem-solving strategies to investigate and solve problems from across the curriculum as well as from practical applications.
Follow oral or written directions. (ela 4)
Express opinions clearly and forcefully without interrupting or insulting others. (ela 16)
Use brainstorming, role playing, and standard problem solving strategies to define a problem and suggest solutions. (ela 19)
Gather information such as data, facts, ideas, concepts, and generalizations from oral sources. (ela 51)
Perform operations with signed (positive and negative) numbers, including decimals, ratios, percents, and fractions. (math 1)
Understand basic algebraic properties (i.e., commutative: ab=ba; associative: ab(c) = a(bc); and distributive: a(b+c) = (ab) + (ac)). (math 3)
Understand the best procedures for statistical data collection, organization, and display including making estimates and predictions and drawing inferences. (math 5)
Understand the characteristic differences between theoretical and empirical probability (e.g., the theoretic probability of rolling a six and a die is 1/6; empirical probability is derived from repeated experimentation or accumulated statistics.). (math 20)
Determine the probability of single and compound events using the basic premise that the probability of an event is equal to the number of ways it can occur divided by the total number of outcomes. (math 25)
Use direct proof and indirect proof sequencing techniques to reach a conclusion. Direct proof uses the Laws of Reasoning to create an orderly arrangement of steps leading to a conclusion. Indirect proof uses an initial assumption that the conclusion is false, and through a series of logically sound reasoning steps the statement may be proved otherwise. (math 32)

Scoring Guide:

See attachment: It's Probable That….Scoring Rubric

Keywords

English Language Arts	Mathematics	Science
Reading	**Algebra**	**Earth Science**
Writing	**Geometry**	**Life Science**
Communications	**Statistics**	**Chemistry**
Literature	**Calculus**	**Physics**
Other	**Trigonometry**	**Other**
	Other	

Chart

It's Probable That…Scoring Rubric

3	**BEYOND**	Analyzed and readily understood the task. Developed an efficient and workable strategy. Showed explicit evidence of carrying out the strategy. Synthesized and generalized the conclusion.
2	**AT LEVEL**	Understood the task. Developed a workable strategy. Inferred (some evidence) but not always clear. Connected and applied the answer.
1	**NOT YET AT**	Partially understood the task. Appropriate strategy some of the time. Possible evidence of a plan – not clear. Partial connection of answer.
0		Totally misunderstood. Inappropriate, unworkable strategy. No evidence of carrying out a plan. No connections of answer. Blank.