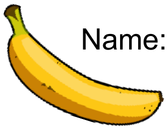

Name: ______________________________________ Hour:_______ Date: ___________

Who will win the Last Banana?

Suppose that you're on a desert island playing dice with another castaway. The winner's prize will be the last banana. Here are the rules of the game:

- Each player rolls a die
- If the largest value shown is a 1, 2, 3, or 4, then Player 1 wins
- If the largest value shown is a 5 or 6 then Player 2 wins

1. Who do you think has advantage in this game: Player 1, Player 2, or neither? Make your **best guess** and explain your choice.

2. Play the game 20 times with your partner and record the winner of each game by tallying in the table below.

Player	1	2
Tally/Count of Wins	𝍸 III	𝍸 𝍸 II
Percentage of Wins	40%	60%

Experimental Probabilities

a. How many times did Player 1 win? 8 Write this as a proportion. .40

b. How many times did Player 2 win? 12 Write this as a proportion. .60

Probabilities add to 1.

3. Who won more often? Maybe this was only true for your group. Let's see how the rest of the class did. Write the number of wins for Player 1 in the table on the board.

a. Find the total proportion of wins for Player 1 for the whole class.

$138/320 = 0.43$

b. Find the total proportion of wins for Player 2 for the whole class.

$182/320 = 0.57$

Complement
$P(2) = 1 - P(\text{Not } 2)$
$P(2^c)$

4. To determine the true probability of Player 1 winning, we should list out all possible rolls that we could get. Complete the table below to show all possible rolls.

	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

Sample Space: List of all possible outcomes

Theoretical probability

a. Use your table to find the probability of Player 1 winning.

$\frac{16}{36} = \frac{4}{9} = .4\overline{4}$

Law of Large Numbers

b. Which was closer to the probability you found in #4a, your group data or the classroom data? Why do you think that is?

The class data, there were more games played.

Name: ____ Hour:_______ Date: ___________

Basic Probability Rules

Important ideas:

Probability Model: List showing all possible outcomes and their probabilities.
- must add to 1
- Each probability is between 0 & 1.

• Complement: Probability of an event NOT happening.
$P(A^c) = 1 - P(A)$

• Mutually Exclusive: Events cannot occur together.

• General Addition Rule: "OR"
$P(A \text{ OR } B) = P(A) + P(B)$

Check Your Understanding

Pew Research Center reported that among mothers, family size is shrinking. Suppose we are to randomly select one mother (age 40 to 44) and record the number of children she has. Here is a probability model.

Number of Children	1	2	3	4+
Probability	0.22	0.41	0.24	0.13

(a) Explain why this is a valid probability model.

Each probability is between 0 & 1. The probabilities add up to 1.

(b) Explain why events "have 1 child" and "have 2 children" are mutually exclusive

You can't have exactly 1 child and exactly 2 children at the same time. The events cannot occur together.

For each of the following write the event using proper notation and find the probability:

(c) Find the probability that a randomly selected mother has less than 2 children.

$P(1 \text{ child}) = 0.22$

(d) Find the probability that a randomly selected mother has 1 or 2 children.

$P(1 \text{ child OR } 2 \text{ children}) = 0.22 + 0.41 = 0.63$

(e) Find the probability that a randomly selected mother does not have 4 or more children.

$P(4{+}\text{ children}^c) = 1 - 0.13 = 0.87$