

Chapel Hill Math Circle
Elementary Group (4-5)
February 20, 2016

Warm-Up...

1. Most games that people like to play involve some combination of luck and skill. Work with a partner to list a few games that are mostly skill and a different list of a few games that are mostly luck. Can you think of any games that are pure luck or pure skill?
2. Roll two standard dice and sum the result. What is the minimum possible sum? What is the maximum possible? What are the most common rolls? Roll the dice lots of times (20?) and work with a partner to tally the results in a simple table.
3. If you were rolling just a single die, what is the probability of rolling a “4”? What is the probability of rolling anything other than a “4”? You probably wrote your answers as fractions...what does the denominator represent? What does the numerator represent?
4. If you were rolling a single die with your left hand and flipping a coin with your right hand, how many different things might happen? Of those, how many are “greater than 2 with Heads”? What is the probability of getting “greater than 2 with Heads”?

Main Course...

1. Monopoly...
 - a. Starting the game at GO!...what are you likely to land on?
 - b. If you own hotels on Boardwalk and Park Place, where do you hope opponents are before they roll?
 - c. Your opponent is “Just Visiting” Jail and is about to take her turn. Would you rather have hotels on all three of the Orange properties (which don’t pay as much) or have hotels on all three of the Red properties (which pay more)? Why?
2. Probability and dice rolls...
 - a. How many different things might happen when you roll two dice?
 - b. What is the probability that you roll a “12”? An “11”?
 - c. Create a histogram capturing the probability of every possible sum from rolling two standard dice.
 - d. What patterns do you notice?
3. Settlers of Catan...
 - a. You start the game by placing your first settlement at the vertex of a hexagon. Where would you want to put your settlement to maximize how many resources you get?
 - b. Are vertices with three hexagons always better than vertices with only two hexagons? Why?
 - c. Do you think the designers of this game understood about probability? Explain.
4. Funky dice...
 - a. What if we rolled two four-sided dice and summed them? Minimum possible? Maximum possible? Most common rolls? Exact probability of most common rolls?
 - b. What if we rolled three five-sided dice and summed them? Minimum possible? Maximum possible? Most common rolls? Exact probability of most common rolls?
 - c. Do weird dice like this really exist? How would you design a die like this such that each number has an equal chance of turning up?