CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Hannah B. Sarver

Project Number
S1313

Project Title
Advance to Go: Monopoly: A Mathematical Model

Abstract

Objectives/Goals
This project aimed to find the best property to buy in the game of Monopoly based on its probability of being landed upon, by mathematical calculation and actual game play. Other factors were taken into account, such as cost-to-rent ratio.

Methods/Materials
Calculate the probability of landing on each space on the Monopoly board from any other space by dice roll and action cards. Create a matrix of board space probabilities in Microsoft Excel, then repeat process with weighted probabilities from the first matrix. Assess the cost to rent ratio of each ownable property on the board and combine with the probability of landing on each to decide on the most practical property purchase. Play several games (15 hours) to identify trends in landing point frequency. Have each player record his dice roll outcomes and landing points. Compile collected data and compare to calculated probabilities.

Results
According to my mathematical calculations, New York Avenue is the most probable property landing point, and the In Jail space is by far the most probable board space. In actual games played, the most landed-on properties were B & O and Reading Railroads, tied with the In Jail space.

Conclusions/Discussion
Considering cost to rent ratios as well as landing probabilities, the Utilities, followed by the Pennsylvania, B & O, and Reading Railroads are the best properties to buy. However, in a short game of Monopoly, many factors affect which properties a player has the opportunity to buy, and landing probabilities do not always even out.

Summary Statement
This project was an exploration of the mathematical probabilities associated with the game of Monopoly, and how they should affect the property purchase decisions of players.

Help Received
I referred to my Math teacher, Mr. Tsuchiyama, for verification that my mathematical procedure was accurate and effective; my mother assisted me in learning how to use Microsoft Excel for mathematical calculations.