CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

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Project Number

J1607

Project Title

Five of a Kind is Hard to Get

Abstract

Objectives/Goals

The reason I chose this project is because I always wanted to know why it was so hard to roll a Yahtzee (five of a kind). My objective was to calculate and then test the probability of getting five of a kind with five dice on a single roll.

Methods/Materials

My materials included 5 regular six-sided dice, pencil, paper, and a personal computer with Microsoft Excel. I used mathematical probability to determine the chance of rolling five of a kind. I then rolled five dice 500 times physically to test the probability. I then used a Microsoft Excel spreadsheet to simulate 24,000 more random rolls. I repeated the 24,000 random rolls 42 more times for a total of 1,008,000 rolls. Finally, I compared the actual results to the predicted probability.

Results

The mathematical probability was 1 in 1,296, or 0.0772%. My actual results on over a million simulated rolls were 0.0773%, almost exactly the expected results.

Conclusions/Discussion

Five of a Kind turned out to be very hard to get on a single roll. I only got 779 of them in over a million rolls. Also, you shouldn#t rely on data from small numbers of tests to test probabilities. I rolled one Yahtzee in 500 rolls or a 0.2% chance. My samples of 24,000 rolls varied from a low of 10 to a high of 27 Yahtzee#s, or a 2.7x difference. However, in 1,008,000 rolls the probability was 0.0773% or almost exactly the predicted probability.

Summary Statement

My project demonstrates how hard it is to get Five of a Kind on a single roll of five dice.

Help Received

My mother helped me roll the dice. My father taught me about probability and helped me make the Excel spreadsheet.