



# CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

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<b>Project Title</b> Step Right Up! Carnival Game Probability	
<b>Abstract</b> <b>Objectives/Goals</b> My objective was to find the real chance of winning a prize at a carnival dice game, and what the operator needs to charge to make a profit. In my hypothesis I stated that I think there is at least a 3 in 6 chance of winning. For the operator to make a profit, he should charge at least \$2.00 due to the costs of the prizes. <b>Methods/Materials</b> I learned probability by solving practice problems so I would have no problem solving my main problem. Then I designed my number tree that would help me with my figuring. I looked for the branches that had one, two, and three of a number 1-6 to find my probabilities. Then I needed to find the expected value, the amount of money on average that it costs the operator per player. <b>Results</b> When my teacher said the results I came up with were wrong. I tried to figure out her point of view but I kept getting my same answer. I realized there might be two ways to look at this problem: the player's point of view or the operator's point of view. Player's point of view: I learned that the number choice does not affect the probability of winning a certain prize. Operator's point of view: you would include the probability of the player choosing a number as well as the probability of the dice showing that number. The answers that I originally got were correct and if the probabilities are the same, the expected value would not change. <b>Conclusions/Discussion</b> I found that my hypothesis was completely incorrect. If the real probability of winning was 3/6, or 1/2 then the game would be fair but it is not. The probability of winning is actually closer to 1/3 (25/72). Carnival game operators want you to think that a game is fair like I did, so that you will play. If you knew that the probability of winning a game was only about 1/3, most likely you would not waste your money. I also incorrectly thought that the operator would have to charge at least \$2.00 to make a profit because of the cost of the prizes. Now I realize what a huge profit carnival game operators make if they only lose on average 60 cents per player (this varies for different games) but charge up to \$2.00 for each person to play. That is an enormous profit of 70%. Now I see carnival games as a gambling device directed at children. Another thing I learned from this is that some probability problems are tricky. There may be several ways of going about solving a problem.	
<b>Summary Statement</b> The probability of winning a prize at a carnival game.	
<b>Help Received</b> My Sister helped in checking work.	