CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J1217

Project Title
The Eleventh Variation

Abstract

Objectives/Goals
The purpose of this project is to determine if there is a mathematical solution for the card trick known as The 11th Variation. How does the mystery card the volunteer selects always end up being the eleventh card in the stack after the trick is done?

Methods/Materials
A volunteer selects a card from a group of 21 cards and places it back in the stack. The dealer distributes the cards into 3 columns with 7 rows. The volunteer only confirms the column his card is in. The dealer picks up the cards placing the identified column between the other two. This procedure is repeated two more times. After the third cycle, the dealer counts down to the eleventh card in the final stack to reveal the card chosen by the volunteer.

Results
Let x equal the initial position of the mystery card (MC) in the stack of 21 cards. Let y equal the MC row position. The first equation becomes: $y = x/3$, this row result is rounded up to the nearest whole number. Placing the MC column between the other two places 7 cards are ahead of the MC column. The MC position now becomes $x = 7 + y$. Substituting any initial card position for x (i.e. 1-21) and performing the calculation three times always ends with a final MC solution of eleven. The mystery card is always the eleventh card from the top of the stack regardless of it' initial position.

Conclusions/Discussion
The results from the research proved that there is a mathematical solution for the 11th Variation. I found the formula for the position of the mystery card. I found out why the mystery card is always the eleventh card from the top. Now, since I have found out the math behind this, I figured out that not all card tricks require deception in order to be successful.

Summary Statement
Proving that some tricks involve no deception or trickery at all, they can be explained mathamatically.

Help Received
Mr. Minton got me started by helping me express my ideas and my father helped with the results.