

# Mathematical Puzzles, Games and Other Diversions

Day 6

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## Project Ideas

- ▶ Fitch-Cheney Poker Trick variations (from Day 4)
- ▶ Topological oddities (mobius strips, klein bottles, knot theory)
- ▶ Blackjack and Card Counting
- ▶ Speed Math (fast multiplication, roots, day of the week)
- ▶ Rubik's Cube or other mathematical toys
- ▶ Sudoku
- ▶ Pentominoes
- ▶ Conway's Game of Life
- ▶ Counterfeit Coin Problems
- ▶ Shuffling Cards (e.g. perfect shuffles, randomization, tracking, patterns)
- ▶ Cryptography (coding/decoding messages)

## Project Ideas (cont.)

- ▶ Prime Numbers
- ▶ Game Theory
- ▶ Electoral Systems and fairness criteria
- ▶ Gerrymandering and mathematical solutions
- ▶ Queueing (math of traffic flow, lines at the grocery store)
- ▶ Nim and variant games
- ▶ Menace/AI (tic-tac-toe playing AI built using matchboxes)
- ▶ Special Numbers: (e.g. Pi, e or the golden ratio)
- ▶ Infinity
- ▶ Surprising results in prob/stats (Base rate fallacy, simpson's paradox)
- ▶ Mathematically Stacked Decks
- ▶ Graph Theory (Euler tours, Hamiltonian circuits)
- ▶ Mathematical Fallacies

## More Project Ideas

- ▶ Writing a program that solves a puzzle, plays a game, performs a magic trick.
- ▶ Present and explain a reasonably difficult mathematical riddle/puzzle/trick
- ▶ Profile of a mathematician and his/her work (e.g. Martin Gardner, Ada Lovelace, Lewis Carroll, Alan Turing)
- ▶ Profile and explanation how somebody beat the casino, the lottery or horse racing.
- ▶ Collecting and/or analysing specific data (baseball stats, gambling systems, population growth, etc)
- ▶ Collect/present rules and strategy for mathematical game(s).