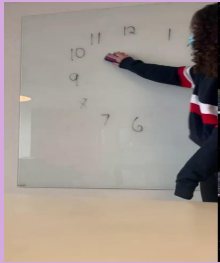
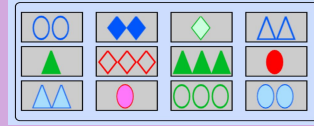


# Math, Magic, Puzzles, and Games (HONR 1310)

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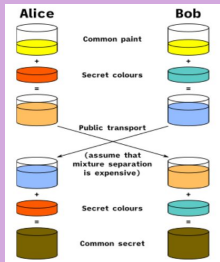
Kruskal Count Clock Trick Demonstration



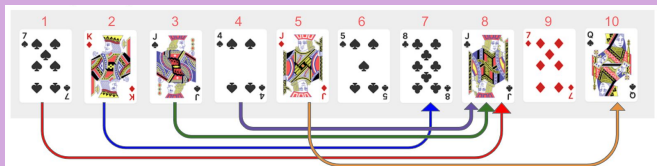
Kruskal Count State Names Demonstration

## Kruskal Counts and Encryption

The Kruskal count tricks were a series of tricks relating to predicting the final landing spot of the audience member without knowing their starting location. The Clock trick predicts the final number no matter which number the audience member begins with. The state's trick uses words of different lengths to guarantee the last state they will land on can be predicted by the magician. The last trick was a card trick that lets the audience pick one of ten starting cards. They count forward the value of the card until they reach near the end of the 52 cards. There is a high probability that many of the paths overlap allowing the magician to predict the final card, but the mathematical probability of this trick failing is around 1 in 6. The Kruskal Count was used a decryption method so there is also a game included where two students try to agree on a secret number, but other students can overhear their conversations and are trying to decipher their secret number and there is a brief explanation of the Diffie Hellman key exchange.

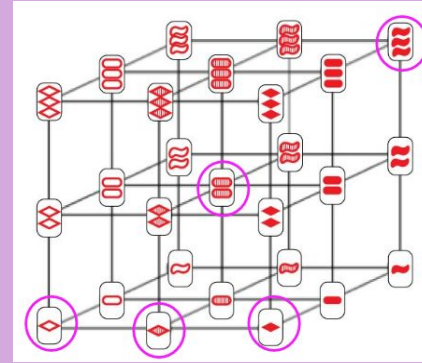


A Diffie Hellman Key Exchange method for communicating encrypted data



Kruskal Count Card Trick

## Set and Ultimate Tic Tac Toe



The Game of Set is a game that involves finding 3 cards that either have all the same feature or no features in common. The features can include shape, color, shading, and number. The characteristics can be related to dimensions and the game can be thought of in three dimensions or four dimensions.

The game of set can also be visualized as a very complex game of tic tac toe, as 3 cards in a straight line form a set when organized in the cubic shape. Tic Tac Toe is a very simple game though, so we dove into the strategies of ultimate tic tac toe, an alternative version of the game where winning the smaller grid marks the squares with a larger X or O and the overall winner is one with three in a row of large X's or O's.

