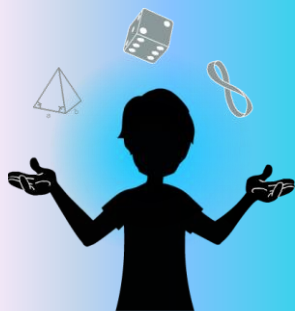


MATHEMAGIC

-THE TRUTH COMES OUT OF THE PACK-



AMAZINGMATHS

Materials :

- Magic Trick video
- 8 playing cards per team
- Paper
- Pencils

How to do the Magic Trick

1. The magician takes 8 cards and creates 4 packs of 2 cards.
2. Then, he turns around and asks the spectator to choose a pack of cards and then choose one of the two cards. Once this is done, he asks the spectator to place the chosen card under the other card in his pack and to place the pack on top of the remaining 6 cards.
3. The magician then asks the spectator to reveal his card to him by specifying that he can lie if he wishes.
4. When the spectator tells him his card (for example, the two of spades), the magician explains that the pack will reveal if he is lying or if he is telling the truth. To do this, he will spell the name of his card with the pack.
5. The magician then spells out each word of the name of the spectator's card by dropping a card for each letter, starting with the top of the pack. For example, for "two of spades", he spells T-W-O by dropping three cards, one at a time. He then places the rest of his pack over these 3 cards without changing the order. He starts again for the O-F and for the S-P-A-D-E-S.
6. Once the magician has spelled the so-called spectator's card, he checks to see if he has said the truth by spelling the word T-R-U-E and turning over the card corresponding to the letter E. The card is the spectator's card!



Mathematical Explanation



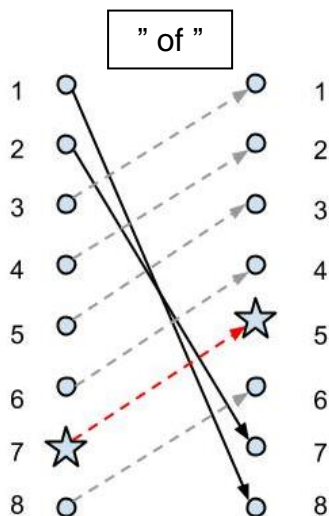
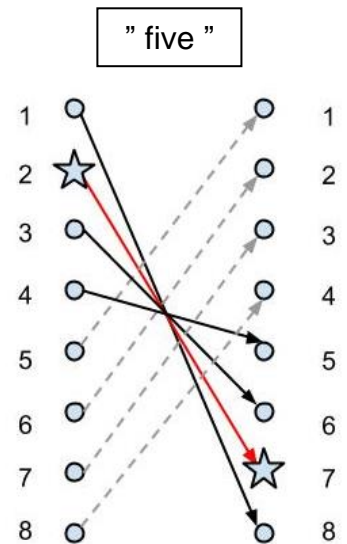
Why this Trick Works

According to the instructions given by the magician, the card chosen by the spectator is placed in second position from the top. Then, when we spell the different words, the card will change place to finally end up in the 4th position in the pack. So, when we spell the word "true", the card corresponding to the "E" is the spectator's card.

In addition, it is important to note that regardless of the words spelled, the spectator's card will always be in the 4th position.

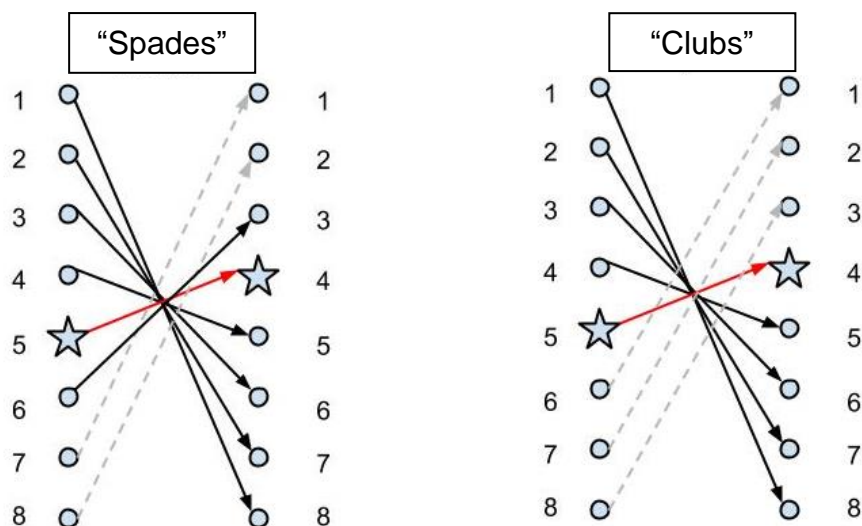
Detailed Explanations

First, when you spell the first word, you can see that it always has between three and five letters: "Ace" has three letters and "Three" has five, and all other cards have 3, 4 or 5 letters. So, the first three to five cards will be sent to the bottom of the pack, as in the following example. We notice that the second card is always found, regardless of the number spelled, in the second-to-last position. The position of the other cards is not important.



Then, when we spell "of", our card is sent to the 5th position, because only the first two cards will be transferred to the bottom of the pack. As each card name has a "of", we know that this transition will be made, regardless of the card the spectator claims to have chosen. The spectator's card is then found in the fifth position.

Finally, when we spell the last word, we see that our card is always sent in 4th position. Indeed, the four suits (spades, hearts, diamonds, and clubs) all have 5 or more letters. So, our card, which was initially in 5th position, will be sent on the 4th card, no matter which one we spell. Here are two examples of suits that can be spelled.



As we can see from the diagram, our card is now in fourth position. Therefore, when the magician spells “T-R-U-E”, which has 4 letters, the last card turned over is always that of the spectator.