

AMAZINGMATHS

Materials:

- Magic trick video
- Cards with numbers 1 to 5 on one side and 6 to 10 on the other (see preparation)

MATHEMAGIC

- TURN OF EVENTS -

How to do the Magic Trick

Goal:

Find the sum of the visible numbers indicated by the cards chosen by the spectator.

Preparation:

Prepare five cards. Write the numbers 1 to 5 in black on one side and the numbers 6 to 10 in grey on the other side, so that the cards respectively have the numbers: 1 (Black) and 6 (Grey) ; 2 (Black) and 7 (Grey) ; 3 (Black) and 8 (Grey) ; 4 (Black) and 9 (Grey) ; 5 (Black) and 10 (Grey).

Trick:

1. The magician places the 5 cards on the table with the numbers in black being visible. He turns around.
2. While the magician is turned around, the spectator turns over the cards of his choice and can change their position.
3. While remaining turned around, the magician claims to be able to find the sum of the visible numbers on the cards with only one piece of information. He asks the spectator to tell him the number of cards on which there is a number in grey.
4. The magician reveals the sum of the numbers illustrated on the top of the cards chosen by the spectator.
5. The spectator calculates the sum to confirm the magician's answer. He obtains the same result!



MATHEMATICAL EXPLANATION



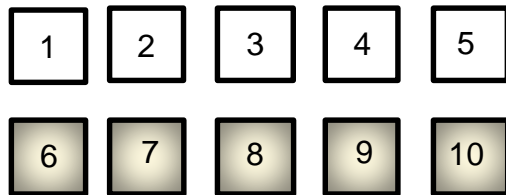
Why this trick works

For this trick we use 5 cards.

Note: To better visualize the explanation, the white cards represent the numbers in black and the grey cards represent the numbers in grey.

- The following numbers are indicated on the white sides: 1, 2, 3, 4 and 5.
- The following numbers are indicated on the grey sides: 6, 7, 8, 9 and 10.

If the cards are all placed with the white sides facing up, we notice that their sum is always 15. ($1 + 2 + 3 + 4 + 5 = 15$)



It should be noted that, for each card, the number on the grey side is always worth 5 more than the number on the white side to which it is associated.

Ex. $1 + 5 = 6$ or $2 + 5 = 7$.

So, if there is only one grey side facing up:



The sum of the numbers is then: $1 + 2 + (3 + 5) + 4 + 5 = 20$.

We thus find the initial sum to which we add 5, that is $15 + 5 = 20$. (We can note that we use the commutativity of the addition.)

For example, if there are 2 grey sides facing up:



The sum of the numbers is then: $1 + (2 + 5) + 3 + (4 + 5) + 5 = 25$.

We then find our initial sum, with an additional 10 ($5 + 5 = 10$).

It should be noted that each grey side adds a value of 5 to the starting sum. So, we simply need to do $15 + (5 \times \text{the number of grey sides})$.

1 grey side: $15 + (5 \times 1) = 20$.

2 grey sides: $15 + (5 \times 2) = 25$.

3 grey sides: $15 + (5 \times 3) = 30$.

4 grey sides: $15 + (5 \times 4) = 35$.

5 grey sides: $15 + (5 \times 5) = 40$.