



AMAZINGMATHS

MATHEMAGIC

- A COLOURFUL PREDICTION -

How to perform the trick

Goal:

Find the number of black (cloud) cards in a pile of cards of different colours.

Trick:

1. The magician asks the spectator to choose 5 (10) red (sun) cards and 5 (10) black (cloud) cards. He must shuffle them well. *(The other cards are not useful for the rest of the trick.)*
2. The magician turns around and asks the spectator to sort the cards in a specific way. The spectator must always take two cards at a time and he must create three piles as follows:
 - a. If both cards are red, place them in the left pile.
 - b. If both cards are black, place them in the right pile.
 - c. If the two cards are of different colours, place them in the centre pile.

The spectator repeats this operation until he sorted the 10 (20) cards.

3. The magician, still turned around, asks the spectator to tell him the number of cards in the left pile (pile of red cards).
4. The magician is then able to predict the number of black cards in the centre pile.

To do so, he calculates: 5 (or 10) minus the number of cards in the left pile.



MATHEMATICAL EXPLANATION



Why the trick works:

For the trick, it is important to note that we use as many red (sun) cards as black (moon) cards (5 or 10 of each colour).

The magician also knows that the red cards are either in the left pile or the middle pile. The right pile only has black cards.

Therefore, when the magician asks the number of cards in the left pile, he then deducts the number of red cards in the middle pile. Indeed, since he knows the total number of red cards (5 or 10) and that the cards in the left pile are all red, he knows that the other red cards are in the middle pile. To find this number, the magician simply has to do the following operation:

- Kindergarten to Grade 1:

$$5 - (\text{number of cards in the left pile}) = (\text{number of red (sun) cards in the middle pile})$$

- Grade 2 to Grade 4:

$$10 - (\text{number of cards in the left pile}) = (\text{number of red cards in the middle pile})$$

But let's not forget that the magician wants to obtain the number of black cards in the middle pile.

However, **in the middle pile, the number of red cards is the same as the number of black cards.** Indeed, the middle pile was created in a way that when we placed a card of a certain colour, we also placed a card of the opposite colour.

So, the calculation done above also gives us the number of black cards in the middle pile!

In fact, we can even conclude that there are as many cards in the left pile as there are in the right pile!