MATHEMAGIC

- THE CLOCK -

AMAZINGMATHS

Materials :

- Magic trick video
- At least 24 cards per team
- A clock representation (optional, available in the appendix of the educational sheet)

How to do the Magic Trick

1. First, the magician has the spectator mix the cards. Then, he gives him the first 13 cards of the pack.
2. The magician turns around and tells the spectator that he can choose as many cards as he wants from these 13 cards, without taking them all, and put them in his pocket. When he is done, he tells the spectator to look at the card that is under the pack that he did not choose and to remember it.
3. Then, the magician puts back the cards that the spectator did not choose over the pack. He then tells the spectator that he will form a clock with the cards. He begins by placing the corresponding card at 12 o'clock, then continues **counterclockwise by placing a card** for each hour.
4. Finally, the magician tells the spectator to take the cards out of his pocket, count them and tell him how many he has. The spectator must then turn over the card corresponding to this time. For example, if the spectator had 7 cards, the magician will turn over the card at 7am. This card is the card that the spectator looked at earlier.

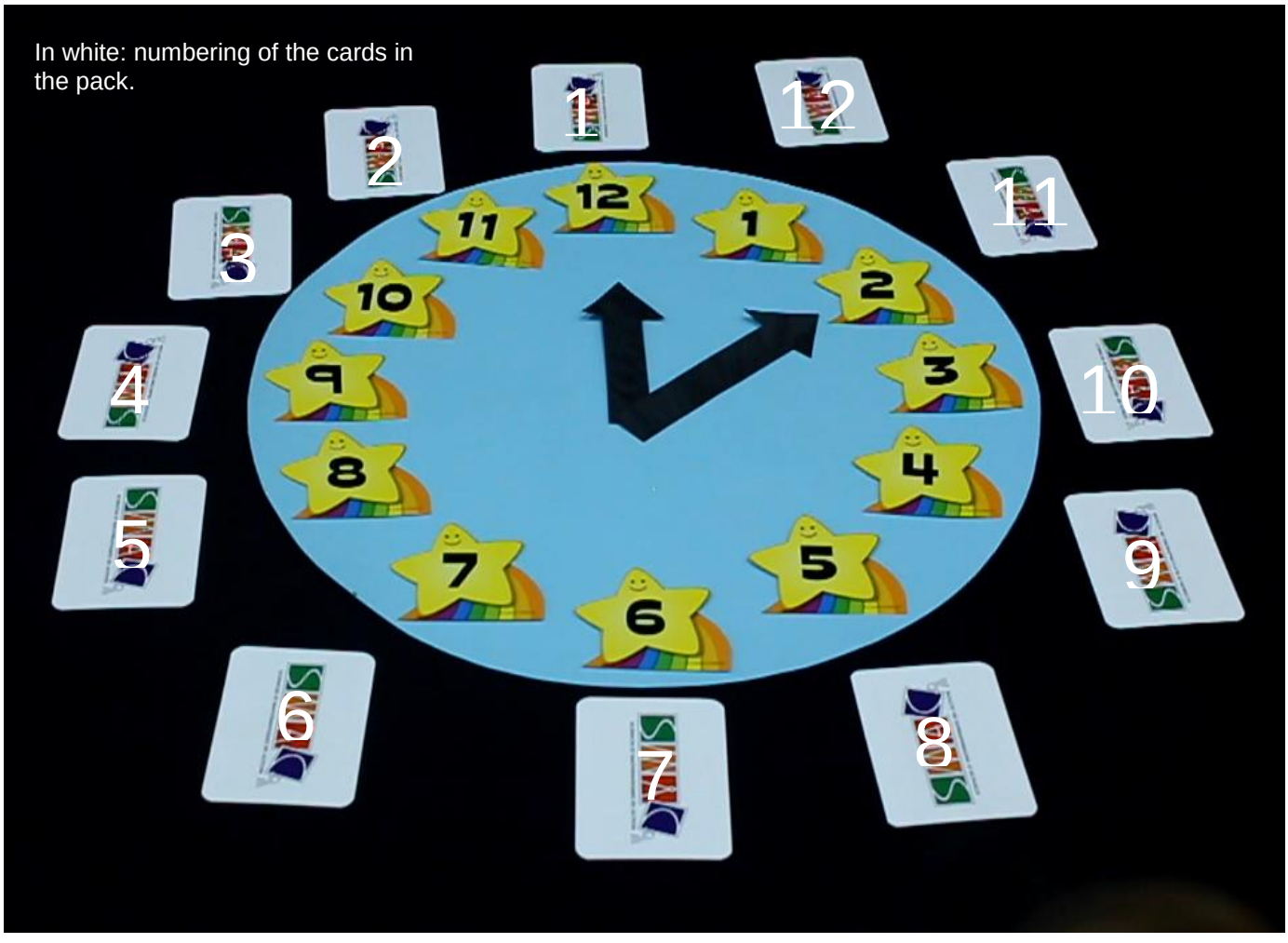
MATHEMATICAL EXPLANATION

Why the Trick Works.

First, the spectator will keep a part of the 13 cards and give the other part back to the magician. We know that the sum of the number of cards the spectator has kept and the number of cards he has given back to the magician always gives 13.

So if, for example, the spectator chooses 3 cards, he gives 10 to the magician. The card he looked at is in 10th position from the top of the deck. Note that the card looked at is always in position "13 – the number of cards kept by the spectator". In addition, since the spectator cannot keep the whole deck, the card being watched is always found between the 1st and the 12th position.

The magician will then arrange the first 12 cards to look like a clock, starting at 12 o'clock and turning counterclockwise. This way, if you add up the position of the card and the time at which it is placed, it always gives 13.

In summary, we know that the position from the top of the deck of the card looked at, added to the time at which it is placed, gives 13. We also know that this same position, added to the number of cards kept by the spectator at the beginning of the trick, also gives 13. We can therefore conclude that the time at which the card is placed corresponds to the number of cards kept by the spectator.

Number of cards seen by the spectator	1	2	3	4	5	6	7	8	9	10	11	12
Position of the seen card	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**