MATHEMAGIC
- THE MISSING LINK -

How to do the Magic Trick

Goal:

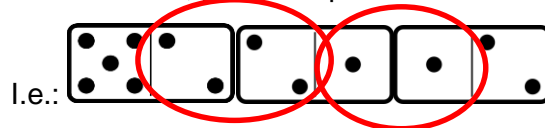To find the domino chosen by the spectator.

Preparation:

For this trick, the magician uses a regular set of dominos from which he removes all the double dominos. Therefore, he uses 21 dominos and verifies that his domino set is complete.

Trick:

1. The spectator chooses a domino and keeps it hidden. The magician's goal is to find which domino was chosen by the spectator.

2. The magician asks the spectator to create a traditional domino chain with the 21 dominos.

   It might be necessary to explain to the spectator that to create a traditional domino chain, you must place two matching tile sides one next to the other.

   I.e.:

3. The magician looks away while the spectator creates his domino chain; other spectators may help him build the chain.

4. Once the dominos are in place, the magician looks back at the dominos. He then reveals which domino was chosen by the spectator by naming the two numbers of the missing domino.
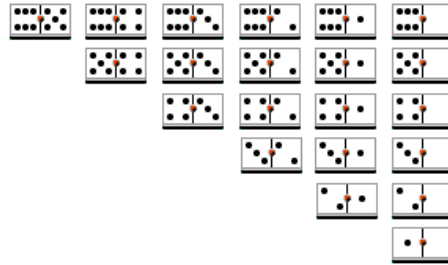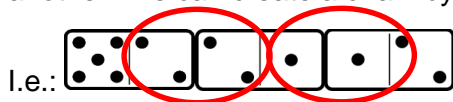
Why the Trick Works

Here are the dominos used to do the trick. They are the dominos found in a traditional domino set from which we have removed all the double dominos.

By looking at the composition of a domino set, we notice that each of the dominos can be linked to one another. We can create a chain by placing two tiles of the same value next to each other.

I.e.:

The key to the solution is by knowing that there is an even number of dominos with the same value (there are six for each number). When we have 21 dominos, we can create a chain because both ends of the chain have the same value. Therefore, it is possible to create a loop with the domino chain.

N.B. There are several ways to form a traditional chain with a set of 21 dominos.

Image 1.1: Loop formed by the 21 dominos

When we remove a domino, the values represented on this domino find themselves an uneven amount of times in the game (five times instead of six). Therefore, it is impossible to form a loop because both ends can no longer be connected as their values are different. So, by forming a chain with the remaining dominos, the values that find themselves at both extremities are the ones that are present an uneven amount of times in the game. Therefore, the numbers that are found at the extremities of the chain are the ones that are on the missing domino.
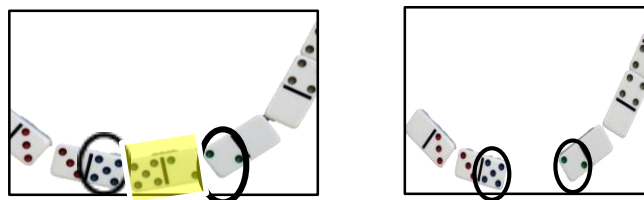
Images 1.2 and 1.3: (Zoom on the loop) Connection between the numbers at the extremities before and after having removed the domino

The magician can then find which domino was removed because it is the one that breaks the loop.