

# Math Magic Puzzles

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Can you do the Puzzler's card tricks below? You do not need any special cards with gimmicks or a card with pencil dots or anything. For most of them, you do not need any sleight of hand, multiple outs, magician's force, magician's choice, etc., either.

## **Trick #1: 4x5**

### **How it looks overall:**

Although the spectator mixes the cards in the packet well, the Puzzler's spells make the cards specially arranged three times.

### **How it looks in detail:**

1. With a packet in his hand, the Puzzler says, "Here are five Clubs, five Hearts, five Spades, and five Diamonds, that is,  $4 \times 5 = 20$  cards in this packet, which I have already cast a spell upon."
2. Have the spectator cut the packet (and complete the cut) as many times as she likes, deal any number of cards, counting one by one, from the packet onto the table, and then riffle shuffle the two resulting packets together. The Puzzler notes that the cards are well mixed then.
3. Saying, "However, as I have already cast a spell upon the cards...", the Puzzler shows that every group of four cards from top to bottom consists of a Club, a Heart, a Spade, and a Diamond. He puts the five sets of cards face-up in one pile on the table.
4. The puzzler takes up the pile, turns it face-down and, without any shuffle or cut, casts a spell upon it. Then he shows that every group of five cards from top to bottom consists of cards with five different face values from one to five. While showing it, he notes that some five card sets lack some suits and sometimes even the same suits are next to each other: "So, the first spell has already been broken and only the second spell is working now." He puts the four sets of five cards face-up in one pile on the table again.
5. As if ending, however, the Puzzler continues: "The other day, when I showed these two magical powers to my daughter, she innocently said 'How about a third spell?' Well, as I had used magical powers twice already, little energy was left. But I tried." The Puzzler takes up the pile, turn it face-down and, without any shuffle or cut, casts another spell upon it. Then he shows that every pair of cards from top to bottom has both a black card and a red card.

### **Comments for magicians:**

While the basic principle for this trick is well-known to you, I designed it as I think that causing such three consecutive effects as above is rather unusual if not quite novel.

## **Trick #2: RH+**

### **How it looks overall:**

Although which card is face-up or face-down is subject to the spectator's free choices, only a very special set of cards are finally face-up.

### **How it looks in detail:**

1. The Puzzler hands a packet of, say, twenty cards to the spectator, asking her to shuffle the packet thoroughly.
2. Taking the cards back from her, the Puzzler quickly deals the cards from the packet onto the table while he turns over some cards and makes a pile of all the cards with some face-up and the others face-down seemingly in a completely random order.
3. Then, again, some cards are turned over and all cards are piled again on the table. But, this time, it is the spectator who steers the ship. At every step, she decides "one" or "two." If "one," take a card from the top of the packet, turn it over, and put it on top of the pile. If "two," she decides "turn over" or "leave (as they are)." If "turn over," take two cards from the top of the packet, turn them over, and put them on top of the pile. If "leave," take two cards from the top of the packet and put them, without turning over, on top of the pile. She repeats this routine until all cards from the packet are piled again on the table.
4. The Puzzler deals the piled cards into two piles (left, right, left, right, and so on), takes one of the two, turns it over, and puts it on top of the other pile. Then he spreads all the cards to see that only a special set of cards, say, some royal flush, are face-up and all the rest are face-down.

### **Comments for magicians:**

I know this kind of effect is not new to you. But I feel the way of shuffling by the spectator described above conceals the trick better than the classic way of shuffling.

## **Trick #3: ERR**

Different from other MMP tricks, this trick requires some sleight of hand.

### **How it looks overall:**

Although the spectator hides her card well in the deck, the Puzzler finds it by seeing the faces of cards in the deck.

### **How it looks in detail:**

1. The Puzzler hands a full deck to the spectator, asking her to shuffle it thoroughly.
2. Taking the deck back from her, the Puzzler quickly shuffles it once.
3. The Puzzler instructs the spectator to do the following: While the Puzzler turns away, the spectator takes about one fourth of the cards of the deck up together as a packet from the top, holds it in her right hand, looks at the bottom card, remembers it, uses her left hand to cut the remainder of the deck in the middle into two parts, inserts the packet in her right hand between them, and squares up the resulting deck.
4. The puzzler turns back, investigates the faces of the cards in the deck, and finds the card the spectator remembers.

### **Note:**

To do this trick, you need to peek at the faces of a minimum number (two, in fact) of cards during Step 2, perhaps while you perform some false shuffle.

### **Comments for magicians:**

This may remind you of Dai Vernon's Emotional Reaction, but the trick is quite different.

## **Trick #4: One Packet, Two Spells**

### **How it looks overall:**

Two spells selected by the two spectators do work at the same time upon one packet and the Puzzler's two predictions come true.

### **How it looks in detail:**

1. The Puzzler asks two spectators to help him. He hands a full deck to one of the spectators, asking her to shuffle the deck thoroughly.
2. Taking the deck back from her, the Puzzler says, "I take about six cards from the top," takes cards, and put them onto the table.
3. The puzzler hands the rest of the deck to one of the spectators, saying, "To prevent me from knowing how many cards are in the pile, while I turn away, take about six cards, maybe seven, eight, or five cards, together from the top of the deck and put them on top of the pile." While the spectator does so, the Puzzler writes down two predictions on a piece of paper.
4. Have the two spectators select their respective spells almost freely from, say, city names. Here, as an example, let them be "New York" and "Los Angeles. (While the exact number  $n$  of cards in the pile is unknown, two spells must be selected so that the number of letters of either spell must be smaller than  $n$  and the total number of letters of the two spells must be larger than  $n$ .)
6. Have the first spectator deal from the pile onto the table, one card for each letter of "N-E-W-Y-O-R-K," and then put the remainder on top. Have the second spectator deal from the resulting pile onto the table, one card for each letter of "L-O-S-A-N-G-E-L-E-S," and then put the remainder on top.
7. The Puzzler notes that the deck was shuffled thoroughly and that he does not know even the number of cards in the pile. Have the first spectator do the same spelling routine yet again with "N-E-W-Y-O-R-K," and then turn over the top card of the resulting pile. The card agrees with the Puzzler's first prediction. Have the second spectator do the same with "L-O-S-A-N-G-E-L-E-S," and then turn over the top card, which agrees with the second prediction.

### **Note:**

To do this trick, you do not need sleight of hand, but you need to peek at the faces of a minimum number (two, in fact) of cards before Step 3.

### **Comments for magicians:**

I designed this trick as I think that two different spells upon one packet at the same time is rather unusual.