# Making Magic Card Match

An Interesting Cyclic Property of a Chain

Suppose we have 5 card stacked in order from 1 to 5 with 1 on top. You can think of the stack as a continuous chain with 5 links. If you move the top card to the bottom the second card in the original stack will now be on top. If you move the new top card to the bottom the third card in the original stack will now be on top. If you do this 4 times the new stack will be in the reverse order of the original stack. The first stack was in order from 1 to 5 with 1 on top and the new stack is in order from 5 to 1 with 5 on top.



Suppose we have 4 card stacked in order from 1 to 4 with 1 on top. It takes 3 moves to completely reverse the order of the original stack.



It takes N-1 moves to completely reveres a stack with n cards,

## How do we turn this Math Effect into a Magic Effect?

## We introduce a second stack with the second stack in reverse order of the first.

Suppose we have 2 stacks of 5 cards each as shown below. The left stack is in order from 1 to 5 with 1 on top. The right stack is in order from 5 to 1 with 5 on top. If you move the top card of the right stack to the bottom of that stack the second card in the right stack will now be on top. If you move the new top card in the right stack to the bottom the third card in the right stack will now be on top. If you do this 4 times the top card from the right stack will match the top card from the left stack.



## Take the top cards that match off of both stacks and set them aside.

You now have 2 stacks with 4 cards in each stack. If you move 3 cards in the right stack as we did in the above example the top card in the right stack will match the top card from the left stack.



5

4

3

2

2	
3	
4	
5	

4	2
3	3
2	4
5	5







2

## Take the top cards that match off of both stacks and set them aside.

You now have 2 stacks with 3 cards in each stack. If you move 2 cards in the right stack as we did in the above examples the top card in the right stack will match the top card in the left stack.



Take the top cards that match off of both stacks and set them aside.

You now have 2 stacks with 2 cards in each stack. If you move 1 card in the right stack as we did in the above examples above the top card in the right stack will match the top card in the left stack.



5

3

4	4	4
5	5	

The top cards match after I rotation.

Take the top cards that match off of both stacks and set them aside.

4



The 2 cards match

The last 2 cards both match.

You have moved a different number of cards from the top to the bottom 5 times and each time you have produced a set of matching cards.



#### How can we improve this effect?

The moves do not all have to be from the same stack. You can move a card from the top to the bottom of the right stack M1, and then move the a card from the top to the bottom of the left stack M2, and then move the a card from the top to the bottom of the left stack M3, and then end with a move of the card from the top to the bottom of the right stack M4. The top cards will still match.

The first move was with the right stack, then the left stack was moved, then the left stack was moved and then the right stack was moved.



#### Take the top cards that match off of both stacks and set them aside.

First move was with the left stack, then the right stack was moved, then the left stack.



#### Take the top cards that match off of both stacks and set them aside.

First move was with the left stack, then the right stack was moved, then the left stack.

M2

4

2

5









The top cards match. after 2 moves.

## Take the top cards that match off of both stacks and set them aside.

The left stack was moved.



Take the top cards that match off of both stacks and set them aside.



5 The last cards match after I move

You have moved a different number of cards from the top to the bottom 5 times. You got to choose which stack would have it's card moved each time. And no matter which stacks you chose to move the cards from top to bottom you have produced a set of matching cards at each step.



#### Now for the matching cards!

You can make 2 sets of the same cards like the ones below as the matching goes on it does seem like magic at the end.

How can this be happening	Wow! The Cards match	Not again	It's Magic
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Or you can make 2 sets of different cards that have matching concepts.

5 + 2	12 – 4	5 times 3	21 divided by 7	It's Magic
7	8	15	3	It's Magic

## The ways to match is endless. Have some fun with it.

**Note:** Do not print the cards in different colors. It will make the pattern more obvious. I use white 3 by 5 note cards and hand write the words on them so I can leave them with the class. I also have a set that is laminated for reuse. These cards have a nice matching pattern on the back of all the cards and were printed back to back on my printer. Each card has the pattern on one side. I then cut out the words and tape them on the other sides. I them laminated each card. These cards have a nice weight to them and last well.

#### How can you improve this effect even more?

With this effect you must tell the student they will make 4 moves, then 3 then 2 then 1. You can disguise this and make it look more like a spelling trick by using a sentence that the student will use to direct the number of moves. Make a cards with a sentence with 4 words. The first word will be 4 letters long, the second word will be 3 letters long, the second word will be 2 letters long and the last word can be any letters long.



#### Procedure.

1. Ask 2 students to come up and help. Give one student one stack and a second student the other stack. As you do so, warn them not to turn the cards over to look at them or shuffle them.

2. Lay down the sentence card in front of the students Tell the students that they will spell out the words on the card by moving a card from the top to the bottom of either stack for each letter in the word. Ask one student to determine which stack will have it's top card moved as they spell each letter of the word. As you spell out "Math" they will move 4 cards, 1 at a time, from either stack they choose. You say "M" and have the student decide which stack will have it's top card moved. See that the correct student takes their top card and moves it to the bottom of the stack. You say "A" and do the same thing. Continue with "T' and "H". Stop at this point and take the top cards off of each stack. Turn them over and show that they match. Set these cards aside

3. Then ask the student to repeat this with the next word "can" by spelling "can" and moving 3 cards. As they spell out can hey will move 3 cards, 1 at a time, from any stack they choose. Turn over the top cards and show that they match. Take the matching cards

4. Then ask the student to repeat this with the next word "be" by spelling "be" and moving 2 cards. As they spell out can hey will move 3 cards, 1 at a time, from any stack they choose. Turn over the top cards and show that they match. Take the matching cards

5. This leaves 2 cards. You can have them spell out Magic but it will only be with one card in each stack. Turn over the top cards and show that they match. Take the matching cards

**Note:** I like the last word to be more than 1 letter long. It hides the 5, 4, 2, 1 pattern a bit and allows for more words that can be used to end the sentence with.

Note: If you think of the cards being in a stack numbered 1,2,3,4,5 then the order the cards will appear is 3, 1, 4, 2, 5. If you want the last card turned over to be "It must be magic" it must start out as the last card at the start.











How can this be happening	It is amazing	Wow! The Cards match	Not again	It's Magic
And the second stack in this order				

and then use the sentence card below to determine the number of cards moved each time.



## 6 Card Option

If you want to add an additional card then the sentence card needs a five letter word at the start. You can use the sentence card below to determine the number of cards moved each time.



You will also need an additional matching card set. Print 2 of the one be below and add 1 to each stack.

