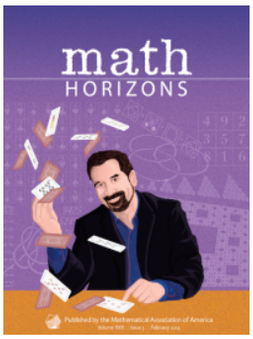

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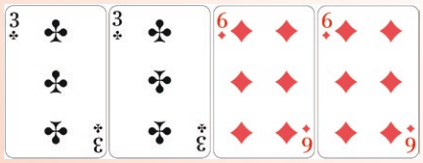
Build Your Own Trick Packet

MICHAEL MATTHEWS, EMILY SCHULTZ, AND ERIN TIEMANN

If you're training to become a "mathemagician," you're bound to encounter a variety of tricks that you'll want to incorporate into your repertoire. We have modified tricks that we have seen others perform (or read about!) by focusing on the gist of the trick and applying it in a different scenario.

One principle that can lead to numerous card tricks is the notion of symmetry. A card is a *pointer card* if it does not have 2-fold rotational symmetry, meaning it looks different when rotated 180 degrees. A *nonpointer card* is one that looks the same after rotation by 180 degrees. For example, figure 1 shows that the three of clubs is a pointer card while the six of diamonds is not. Can you determine all of the nonpointer cards?

Figure 1. The three of clubs is a pointer card and the six of diamonds is a nonpointer.

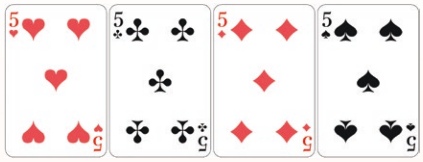


Using rotational symmetry opens mathemagicians up to a variety of tricks. For example, we created the following trick, which we call "Future Fives." This trick was inspired by "The Klein 4 Card Trick" from Colm Mulcahy (see the February 2004 issue of *Math Horizons*).

The Trick: Grab all the "5" cards. Allow a volunteer to shuffle this packet. Take the packet and spread out the cards face down. Then have the volunteer pick one card. After the volunteer looks at the card, have them put it back into the packet, and let them shuffle again. Next, take the packet back and turn it face up. At this point, you will 'read' the volunteer's future. For example, you could say, while picking up the volunteer's card, something like, "You will have five great loves in your life," "Five amazing golf rounds," "Be given a ring with five diamonds in it," or "Will get five freshly dug up flowers," for hearts, clubs, diamonds, and spades, respectively, correctly revealing their chosen five.

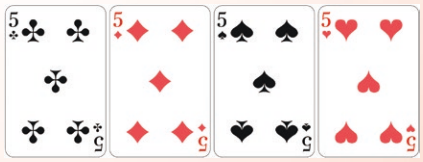
The Ruse: Arrange the cards so that they are all oriented the same, meaning that the spades, clubs, and hearts should all have three pips facing up and two pips facing down as in figure 2.

Figure 2. A starting configuration for the packet.



Notice that the five of diamonds is a nonpointer card so its orientation doesn't matter. While the volunteer looks at their card, discreetly rotate the other cards 180 degrees. The volunteer, focusing on the chosen card, shouldn't notice this sleight of hand. Make sure the volunteer puts the chosen card back in the packet in the orientation in which they chose it. All the cards except the volunteer's now have a different orientation from the start, and the volunteer's next shuffle shouldn't affect orientation. When you turn over the cards, you can determine the volunteer's card by noting which card has a different orientation. If the cards all have the same orientation, you know that the selected card must have been the nonpointer five of diamonds. Try this out yourself: can you determine which card was chosen by the volunteer for the packet pictured in figure 3?

Figure 3. The packet after rotating three cards. The five of spades hasn't rotated.



How many tricks can you create for your mathemagical trick collection using rotational symmetry? How about a trick that incorporates the seven of diamonds (the only diamond pointer card in most decks)? There are other qualities one can think of when creating your own "trick packet;" the freedom is up to you!

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