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The Magic Octahedron

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An octahedral die has several advantages over its cubic cousin, not the least of which is its ability to magically model a four dimensional tesseract. We will use a four coloring of the die to illustrate the magic.

Master craftsman Wayne Daniels has made a beautiful wooden model of the die out of four exotic woods. He also made the four required tiles of the same woods that have the eight domino pips in special order on each side of them. The picture shows Daniels' handiwork and indicates also how easily this die can be tipped to expose a new face (in contrast to an ordinary die). This will be necessary for the magic to work.
The reader may construct his own magic octahedron out of the colored templates accompanying this article. The four colored cards will be necessary also. The magic will be virtually self-working, in fact, the magician need not even touch the materials for most of the effect.

The Effect: The subject is asked to place the four cards down on the table and may turn them so that either side of any card is up. He then tosses the die. If he doesn’t like the face showing he may turn the die or toss it again or even force a number of his choice to appear on top. The magician notes the number showing and now explains how the colors work. If the rolled number is on a red, yellow or blue card the die is turned on those colors by the subject (in any order). If the number is on the green card the die is flipped to its opposite side. Notice that the magician has never touched the die or the cards.

Leaving the die and the cards as is, the subject now chooses any new number from 1 to 8. The magician waves his wand above the table and asks the subject to separate the cards into two groups, one that has the new number and one that doesn’t. The subject may now choose to play either of these and turn the die on the colors of that group. The die will miraculously end showing the new number.

The Method: There is no method— the trick always works if performed as described. When the cards are placed and the die is initially rolled, the die will automatically arrive at a special number that either appears on all four cards or doesn’t appear on all four cards. This is called the “force” number. With the die so armed any other new number chosen will come up on the die when one of the two groups is selected.

If the magician wants to perform the trick again, the trick will fail. If you do want the trick to work a second time, you must turn over either of the two groups to rearm the die. This can be accomplished by letting the subject choose a group to turn over or the magician can surreptitiously turn over a group himself (this is the only case where the magician need touch the cards).

The reason the trick is so successful is that a four-dimensional tesseract can have its directed edges colored red, yellow, blue and green. Its 16 nodes are then carefully labeled twice with the eight domino pips. This careful labeling is already done for you on the template so that you reach the appropriate number no matter whether your subject chooses the colored dimension containing his chosen number or not. Everything is automatic.