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THE TRICK: *Magical Number Nine*

Variation One

1. Select a three-digit number in which none of the three digits is the same.
2. Form another three-digit number by rearranging the original digits.
3. Now subtract the two three-digit numbers and add the digits in this difference.
4. From the first (or last) digit in the sum, you can tell the other digit.

Variation Two

1. Follow the steps above through step #3.
2. If the sum is not one digit, continue adding the digits in the result until you reach a one digit number. You can predict this digit.

UNRAVELING THE TRICK

1. Choose three different variables for the hundred's, ten's and unit's digit of the number, and write them in appropriately labelled columns.
2. Borrow one from the hundred's column, and rewrite the hundred's and ten's digits.
3. Borrow one from the ten's column, and rewrite the ten's and unit's digits.
4. Suppose the permutation selected is the original digits in reverse order. Subtract these digits from those appearing in the table.
5. Sum the digits in the difference above, and use this result to explain the trick.

QUESTIONS TO PONDER

1. What would happen if all the digits in the chosen number were the same?
2. Can two of the digits be the same?
3. Can you verify the trick if one uses a permutation other than the original digits reversed?
4. Will the sum of the digits in the difference always be a multiple of 9?