

Nerdo the Mathnificant **The Amazing Nerdo**

Overview

This is a simple number trick where I will use a three digit number that a volunteer picks to pick a word from a book in the room. I will need a volunteer to pick the number and compute and a separate volunteer to keep track of the envelope which has the word written on it.

Materials

Envelope w/ word written previously on a piece of paper.

Additional item to put the envelope in.

Overhead and marker.

Steps

1. Introduce that you have been testing brainwaves as soon as you got in town last night and have made a prediction and placed it in an envelope. Hand envelope to person in room to keep.
2. Pick another volunteer (V) (by channeling) to go to the overhead to do some simple math.
3. Ask V to write down any three digit number, which is not a palindrome.
4. Have V reverse the digits and write that number down.
5. Subtract the two numbers (to get a positive answer)
6. Have V take that answer and reverse the digits.
7. Add these two numbers together.
8. Have V take the book and go to the page represented by the first three digits. After that find the problem shown by the last digit.
9. V reads the question.
- 10.** Have the keeper of the envelope tear it open and read what is on the paper (V) .

Math

This is based on the compliment of 9's property. Start with any three digit, which is not a palindrome, when you subtract the two numbers the outside numbers will always add up to 9 and the middle digit will be 9. When you add the numbers the first and last digits will add to 9 and the middle digit will add to be 18 which carries over to make 1089.

We will come back to in the Algebra section.

An algebraic solution can be seen when you look at two digit example. The two digit number is represented by ab where a and b are single digits.

$ab - ba = cd$ where $ab > ba$ in order to get a positive answer.

This means $d = 10 + (b-a)$ because you need to borrow from the ten's place in order to subtract. Also because of this borrowing $c = (a-1) - b$

Transformed $d = 10 + (b-a)$ becomes $d = 10 - (a-b)$

And $c = (a-1) - b$ becomes $c = -1 + (a-b)$

Adding the outer digits (c and d) gives $c + d = 10 - (a - b) + 1 + (a - b) = 10 + -1 = 9$
This fits with what we talked about in the above paragraph.

Example

1. V picks 438.
2. Reverses to be 834. $834 - 438 = 396$
3. Reverses to 693. $693 + 396 = 1089$
4. page 108, problem number 9