Math Magic: the Logic behind an Illusion

SUMMARY OF THIS TRICK: The Magician will seem to be able to add a column of 5 six-digit numbers in your head by *rigging the system* as you go along. Then you will guide students to become the Magician and perform the trick.

Vocabulary reviewed or introduced: digit, 6-digit number, greater than or equal to 2 or (≥ 2), sum.

Other skills practiced: quick mental addition or subtraction to 9, adding and grouping tens to quickly add numbers, following the rules to make the trick work, using correct terms to explain the process to the audience when the student is the Magician.

YOU PERFORMING THE TRICK

FIRST: from someone in the group ask for a 6-digit number whose last digit is 2 or greater (≥ 2) Write it for all to see. Here it is **385, 863 —>**

   (Note the last digit of the first number ≥ 2)

Step 2: The audience gives you next **847, 206 —>**

Step 3:   You secretly rig your number so each digit adds up to nine with the row above. **152, 793 —>**

Step 4: Ask for and write down another 6-digit Here someone chose this number **874, 632————->**

Step 5: Your number is rigged to add each digit to 9 with the number ab Here it is **125, 367———.—>**

Step 6:   You can predict the answer once you have the top number, by adding a 2 to the far left of the first number and subtracting a two from the last digit in the first number. Here the answer would be 2,385,863 minus 2 which = **2, 385, 861————>**

Step 7: Verify the results by having the viewers add up the numbers to see if they match your result. I model addition shortcuts by grouping numbers by tens while others used their calculators, but it's still a challenge to add 5 rows of 6-digit numbers without making an error.

DO THE TRICK AGAIN TO WOW YOUR AUDIENCE, carefully following the same procedures as above. At one time I actually took wrote the answer in advance even after I was given the first number, saying I powers to predict the future.

GUIDE THE STUDENTS TO SEE SOME PATTERNS

Circle rows 2 and 3 and rows 4 and 5, ask ask if anyone sees a pattern there. Maybe even circle the digits in the various places there, encouraging students to raise their hand and lead others to have their aha moment of

do thus and so.

ASK FOR AN ABLE VOLUNTEER TO MODEL THE PRESENTATION TO THE GROUP emphasizing presentation, proper use of terms, and correct execution.

Have the students practice with a partner, and finally challenge students to try this on an older family member.

EXAMPLE OF NUMBERS WRITTEN DOWN

385, 863 (first number, from audience ending ≥ 2)

847, 206   (next number given by the audience)

(You will choose digits for row 3 to add with row 2 to equal 999,999)

152, 793   (third number is your rigged number)

874, 632 (Fourth number chosen by the audience)

(You will choose digits for row 5 to add with row 4 to equal 999,999)

+ 125, 367   (Fifth number is your rigged number)

2,385,861   (Quickly present the sum by adding 2 in front of your first number and subtracting 2 from the first number). In fact, you can predict the sum and write it down once you are given the first number! But you have to follow the secret rules.

WHY IT WORKS:

385, 863   row 1= 385.863
847, 206
152, 793   rows 2+3 = 999,999 or 1,000,000 -1
874, 632
+ 125, 367   rows 4+5 = 999,999 or 1,000,000 -1
2,385,861   sum = number in row 1 + 2,000,000 -2

NOTE: I am looking for link to a video which explains this problem, but the process of trying to explain it here is a challenge and benefit in technical writing and reading, Also, as in most my activities, many skills and concepts are covered according to the ability levels. *Eventually it all adds up!*