

Math Magic Trick 2

(organized and proof by Robert Greenlee)

Materials:

You'll need a pencil, two notebook size pieces of paper, a large empty ashtray, some matches or lighter, and a bar of soap.

Preparation:

Ten minutes before you begin the trick, excuse yourself and go to the bathroom. There take the bar of soap in hand and with the corner of the moistened end, carefully draw the number on your forearm. Let it air dry.

Start:

When you begin this trick, ask for someone in your audience who believes they have ESP ability and can do addition and subtraction correctly.

- Step 1) Tell them to choose any three digit number where the first and last digits differ by two or more.
Have them write it down on the first piece of paper without you seeing the number. ex) 672
- Step 2) Tell them to reverse the digits 276
- Step 3) Have them subtract the smaller number from the larger. 672 - 276 = 396
- Step 4) Then tell them to reverse the digits of the difference answer from step 3) 693
- Step 5) Now add the answers from step 3) and step 4) together 396 + 693 = 1089
(Of course, notice that the total will always be 1089!)
- Step 6) Tell them to double check their work and to show everyone the final result as you turn your back.
Then tell them to write the final result on the second piece of paper.
- Step 7) Tell them to fold up both pieces of paper three or four times so that you could not see what was written on them.
- Step 8) Put both pieces of paper in the large ashtray, ignite, and burn completely into ashes.
- Step 9) Tell your mark to concentrate intensely on the final result number and tell your audience that you will divine the number directly from the ashes. Pick up some ashes and rub them directly onto your soap-written arm. As you continue to rub the ashes, incredibly the answer will appear on your arm!!

Mathematical reason how it works:

- Step 1) Let $x = 100$'s digit; $y = 10$'s digit; $z =$ units digit ex) $100x + 10y + z$
- Step 2) Reverse the digits $100z + 10y + x$
- Step 3) Subtract smaller meaning that units digit (x) is always smaller than z , so you will have to borrow 10 from the 10's position. This now means that the 10's digit in the top number is always one digit less than the 10's digit in the bottom number, so you will have to borrow 100 from the 100's position to complete the subtraction.
- $$\begin{array}{r} 100x - 100 + 100 + 10y - 10 + 10 + z \\ - (100z + 10y + x) \\ \hline 100x - 100z - 100 + 90 + 10 + z - x \end{array}$$
- or $100(x - z - 1) + 10(9) + 10 + z - x$
- Step 4) Reverse digits again $100(10 + z - x) + 10(9) + x - z - 1$
- Step 5) Add steps 3) and steps 4)
- $$\begin{array}{r} 100(x - z - 1) + 10(9) + 10 + z - x \\ + (100(10 + z - x) + 10(9) + x - z - 1) \\ \hline 900 + 180 + 9 \end{array}$$
- or $900 + 100 + 10(8) + 9$
- or $1000 + 10(8) + 9$
- or $100(10) + 10(8) + 9$

Which means that the resultant sum in step 5) is always the number 1089!