



AMAZINGMATHS

Materials:

- 2 pieces of paper
- Pencils
- Calculator

MATH EMAGIC

- THE MYSTERY NUMBER -

How to do the Magic Trick

GOAL:

To predict the *Mystery Number* that will be obtained.

TRICK:

1. The magician asks a spectator to write a double-digit number on a piece of paper (1st number).
2. Once the spectator has written the 1st number, the magician writes the *Mystery Number* on another piece of paper, and hides it. The magician does not let the spectator see what was written on the paper. The magician gets the *Mystery Number* by adding 200 and subtracting 2 to the 1st number. i.e. Spectator writes "59". The *Mystery Number* will be "257" because $59 + 200 - 2 = 257$.
3. The magician asks the spectator to write another double-digit number under the first number written (2nd number).
4. The magician writes the 3rd double-digit number under the 2nd number. The 3rd number written must be one that, when added to the 2nd number, equals to 99. (2nd number + 3rd number = 99). i.e. Spectator writes "72" as the 2nd number so, the 3rd number will be "27".
5. Repeat steps 3 and 4 for the 4th and 5th number. The 5th double-digit number written by the magician must, once again, equal to 99 when added the to the 4th number.

1 st number (spectator)
2 nd number (spectator)
3 rd number (magician)
+ 4 th number (spectator)
5 th number (magician)
Mystery Number

6. There is, therefore, a total of five numbers written one under the other. The magician then asks the spectator to add all five numbers (the spectator may use a calculator to complete this step).
7. Then the magician reveals the *Mystery Number* written at the beginning; the *Mystery Number* and the sum of the five numbers are the same!



MATHEMATICAL EXPLANATION



Why This Trick Works

Let's explain this trick by using an example.

Suppose that, for Step 1, the spectator writes the number 67.

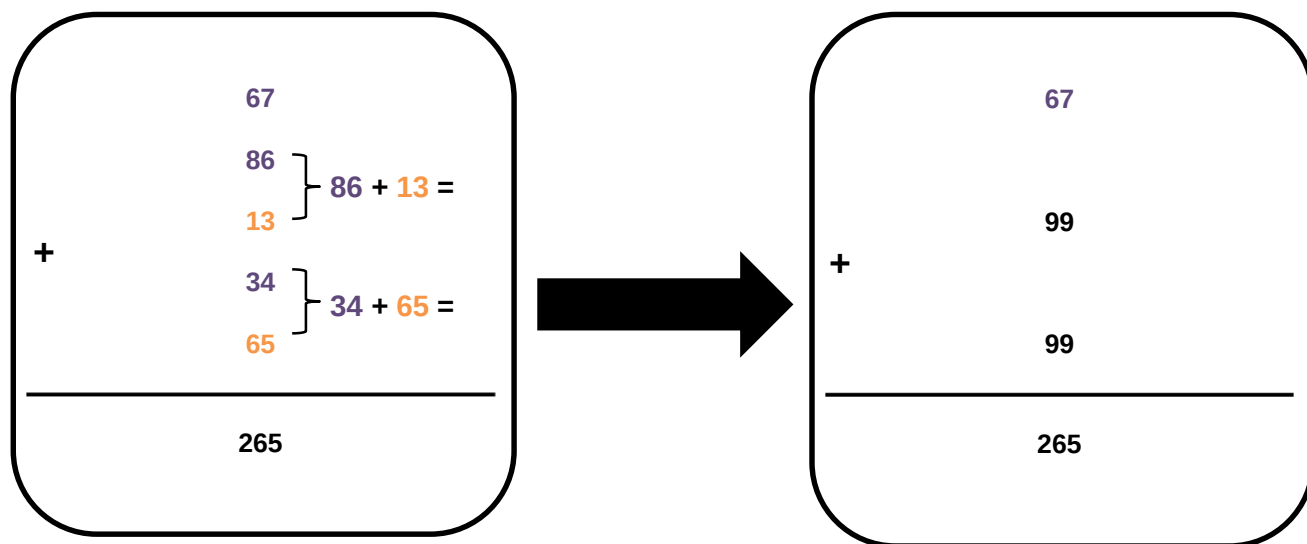
As he sees the 1st number written by the spectator, the magician can quickly predict the *Mystery Number*. The *Mystery Number* is obtained by **adding 200** to the 1st number (67) and by **subtracting 2** (the reason for this specific equation is explained further below). The total of this equation ($67 + 200 - 2 = 265$) is the *Mystery Number*. The magician writes the total of the equation (**265**) on another piece of paper and keeps this number secret until the end of the trick.

For Step 3, the spectator writes another double-digit number; let's say the spectator writes 86.

The key to this trick is in the numbers chosen by the magician. The magician must always consider the last number written by the spectator in order to choose which number to write. The number chosen by the magician must be such a number that, when added to the last number written by the spectator, equals to 99.

In this specific example, the magician writes 13 because $86 + 13 = 99$.

For Step 5, Steps 3 and 4 are repeated. Let's say the spectator chooses to write 34 as the 4th number, the magician then writes 65 as the 5th number because $34 + 65 = 99$.



So, the number 99 is added twice to the first number chosen. Thus, we have: 1st number + (2 x 99). Which corresponds to

$$\text{1st number} + 198 = \text{Mystery Number}$$

Thus: $67 + 198 = 265$.

Note: The magician can quickly predict the *Mystery Number* by adding 200 and subtracting 2 because $198 = 200 - 2$.