

Everyone can participate in these puzzles, compare notes, and share solutions. *Enjoy!*

Math Mind Reader

Amaze your family and friends by being able to reveal numbers they have in mind. Practice each trick so you can perform it with confidence.

A Pair of Predictions

When you and your family sit down for the Thanksgiving feast, how many different ways can you sit at the table? You may be surprised at the number of possible variations.

The trick

Announce that you are going to predict a pair of numbers before they are shared with you.

Ask your volunteer to think of a 2-digit number and enter the number on a calculator or write it on a piece of paper in such a way that you cannot see what is entered or written.

Have your volunteer follow these steps to disguise the number:

- multiply the number by 2
- add 5
- multiply by 50
- subtract 365
- think of another 2-digit number and add it to the total

Ask your volunteer to tell you the number created by these calculations.

Either with a calculator or on a piece of paper so your volunteer cannot see, add 115 to the total. You now have the two original secret numbers in the 4-digit answer.

Announce the original 2-digit numbers by reading the first two digits in your answer as a number and then the last two digits as a number. Enjoy the astonished reaction to your prediction as your volunteer confirms the secret numbers.

The math behind the magic

Multiplying by 2 and by 50 is the same as multiplying by 100. This moves the two digits of the first secret number into the hundreds and thousands place value columns.

The addition and subtraction disguise the first number enough until the second secret number is added. Adding 5 and then multiplying it by 50 is the same as adding 250.

Subtracting 365 at that point takes away 115 more than has been added.

When you add 115 back in, you have 100 times the first secret number plus the second secret number. You can see both numbers in the 4-digit answer.

Example

Volunteer	Example $a=24$ and $b=16$	Algebraic Explanation
think of first secret number, a	24	a
multiply by 2	48	$2a$
add 5	53	$2a + 5$
multiply by 50	2650	$100a + 250$
subtract 365	2285	$100a - 115$
add second secret number, b	2301	$100a - 115 + b$

At this point, you will add 115 to get 2416, which is $100a + b$.

Announce that the two numbers are 24 and 16.

Faster than a speedy calculator!

The trick

Announce that you are going to predict the sum of four numbers before they are even written. Decide ahead of time how many digits you want the numbers to have. The four addends should have the same number of digits. You can have any number of digits in the addends, but 3-digit, 4-digit, or 5-digit numbers show the magic well.

Write the sum on a piece of paper so that no one sees what you wrote. Fold the paper, and either give it to someone to hold or put it in your pocket.

Ask your volunteer to write down two of the numbers for you to add. Show where you want the numbers to be written. You can use paper and pencil or a dry erase board and marker.

Quickly write down your two addends using the secret formula for the trick.

Ask your volunteer to find the sum, either by hand or with a calculator.

Reveal your pre-written answer, and enjoy the amazed reaction!

The math behind the magic

The secret formula in choosing your addends is to be sure that your digits create a sum of 9 with the digits in the numbers your volunteer wrote.

If the first digit of an addend is 9, the matching addend will not have a digit in that column. If an addend has a 9 after the first digit, the matching addend will have a 0 in that column.

The sum will always have one more digit than the addends. It will start with a 1, end with an 8, and have 9s in the middle. The four digits in each column will always total 18; the 1 carries over into the next place value column on the left to create the 9s.

- The sum of four 3-digit numbers will be 1,998.
- The sum of four 4-digit numbers will be 19,998.
- The sum of four 5-digit numbers will be 199,998.

Example with 5-digit numbers

Sum = 199,998

Volunteer addends	63214	49086
Your addends	36785	50913

$$63214 + 49086 + 36785 + 50913 = 199998$$

Example with 3-digit numbers

Sum = 199,998

Volunteer addends	63214	49086
Your addends	36785	50913

$$63214 + 49086 + 36785 + 50913 = 199998$$