The Less You Know The Better

Sometimes a little knowledge is all you need. In the case you will tell a student what the answer is to a subtraction problem without even knowing the numbers they subtracted

Step 1. Ask a student to write down any 3 digit number. Do not have them tell you but have them show a friend. Do not to this for many students as there is a limited number of outcomes.

Step 2. Ask them reverse their number by switching the ons digit with the hundreds digit and write that number down.

Step 3. Ask them to subtract the smaller number from the larger number.

Step 4. Tell them they have calculated a new number by subtraction that you cannot know.

Step 5. Ask them to tell you either the dight on the right end of their answer or the digit on the left end of their answer.   For example, you may say the right digit is 7, or you may say the the left digit is 4.

Step 5. Tell them what the **answer to their subtraction** problem is.

Note: Be sure you do not say you have found the first number they started with. You have found the **answer to their subtraction** problem..

How do I find their answer: The middle number is always 9. The two digits on the ends always total 9. If they tell you one of the end numbers you subtract it from 9 to find the other number

Note: If they say their right or left digit is 9 then their answer is the 2 digit number 99.

Example 1: Their number is 347

Step 1. 347

Step 2. 743

Step 3.   743 – 347 = 396

Step 4.   They say that their answer has a 6 as the right dight.

You say the answer to your subtraction problem is 396

Example 2: Their number is 156

Step 1. 156

Step 2. 651

Step 3.   651 – 156 = 495

Step 4.   They say that their answer has a 4 as the left dight.

You say the answer to your subtraction problem is 495

How it works:

Their are only 9 outcomes when you subtract a number ands it reversed form.

99   198   297   396   495   594   693   792   891

The three digit answers all have a 9 in the middle and the first and last digits total 9. If you know 1 you know the other. If they say their digit is a 9 then its the 2 digit number 99.

Here is an algebraic proof of the trick:

Let one of the 3 digit numbers be A B C and the second will be C A B

A B C can be represented in base 10 values as $100A + 10B + C$

When you switch the ones and hundreds digits you get C A B
C A B can be represented in base 10 values as $100C + 10B + A$

When you subtract A B C – C B A using base 10 notation you get

A B C – C B A = $(100A + 10B + C) – (100C + 10B + A)   = 99A – 99C = 99(A – C)$.

(A – C) is one of the following: 0, 1 . 2 . 3 , 4 , 5 , 6 , 7 , 8 , 9

So, 99 (A – C) is one of the following:

$99*1 = 99$ $99*2 = 198$ $99*3 = 297$ $99*4 = 396$ $99*5 = 495$
$99*6 = 594$ $99*7 = 693$ $99*8 = 792$ $99*9 = 891$

That says 99 (A – C) is one of the following 198, 891, 297, 927, 396, 936 , 495 or 594

Their are only 9 outcomes when you subtract a number ands it reversed form.

99   198   297   396   495   594   693   792   891

The three digit answers all have a 9 in the middle and the first and last digits total 9. If you know 1 you know the other. If they say their digit is a 9 then its the 2 digit number 99.