

February 10th

Example:

Start with 452

Reverse it: 254

$$452 - 254 = 198$$

Reverse it 891

$$891 + 198 = 1089$$

Proof:

Start with "abc" (that is $100a + 10b + c$ with $a > c$)

Reverse it: "cba"

If we try to subtract these using the column method, in the units column $a > c$ so we would need to "borrow" from b , and then when we come to subtract in the tens column, the top b has become $b-1$, so we need to borrow from the a to make it $b+9$

So the subtraction was

$$100a + 10b + c - 100c - 10b - a$$

But has become

$$100(a-1) + 10(b+9) + c + 10 - 100c - 10b - a =$$

$$100(a-c-1) + 10 \times 9 + c + 10 - a$$

Reverse the digits and add:

$$100(a-c-1) + 10 \times 9 + c + 10 - a +$$

$$100(10-a+c) + 10 \times 9 + a - c - 1$$

$$= 100 \times 9 + 20 \times 9 + 9 = 1089 \text{ as required}$$