Algebraic Solution to "Evo Guesses Two Numbers"

Let x be one of the selected non-negative integers and y be the other selected integer, neither greater than 9.

Evo says to multiply one of them by 5. Suppose that we multiply x by 5. We have $5x$.

Evo says to add 7. We have $5x + 7$.

Evo says to double the sum. We have $2(5x + 7)$.

Evo says to add the other number. In our case, the other number is y. We have $2(5x + 7) + y$.

Using the distributive property, we have $10x + 14 + y$.

Now for a bit of logic. Suppose that we subtract 14. We then have $10x + y$. We see that x is in the 10s place of the result, and y is in the 1's place. So, subtracting 14 from the result is the key to guessing the two integers that were initially selected by the student.

The remainder when dividing $10x + y$ by 10 is y.

The 10's place in $10x + y$ is the value of x.