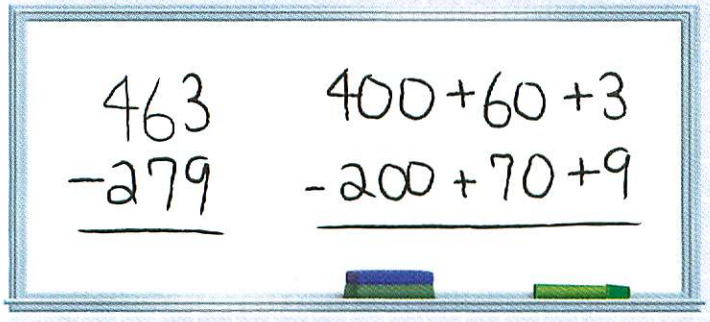
# Working with the U.S. Algorithm

During the past few days, students in this Grade 5 class have been sharing, exploring, and using various subtraction strategies. One of the strategies that several students use is the U.S. algorithm. In this session, students study this strategy, trying to understand its notation. The class has already looked at one example, 674 − 328, in which one ten is "borrowed." Now they look at a more difficult problem.

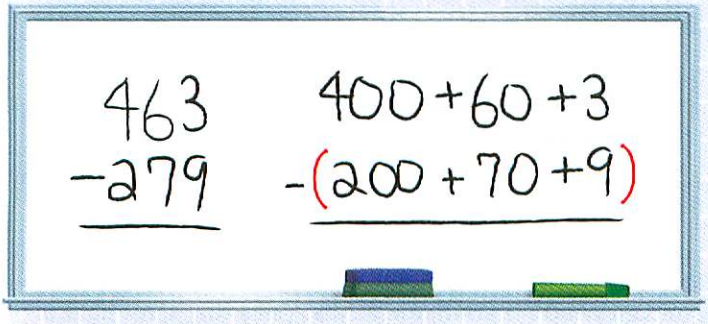
$$\begin{array}{r} 463 \\ -\ 279 \\ \hline \end{array}$$

**Teacher:** We're going to solve this next problem by looking carefully at what happens in each place. Can someone come up and rewrite the numbers by place value?

Martin comes up to the board and rewrites the problem:



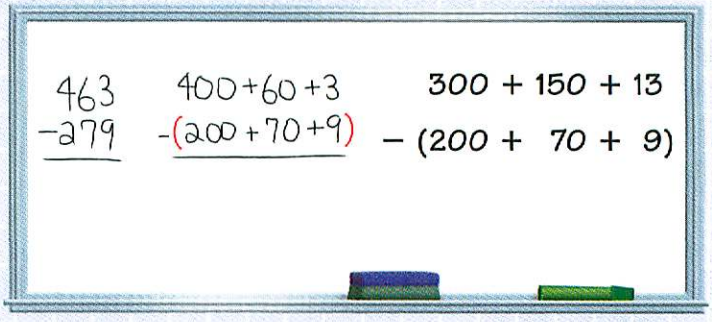

The teacher adds parentheses to what Martin wrote on the board:




**Teacher:** I wrote the parentheses to show that we are subtracting all the parts of the bottom number. Let's try to solve this problem, the way they do in the U.S. algorithm. Martin, what's the first thing you're going to do?

**Martin:** I start in the ones place. If I subtract 9 from 3, I get a negative number, so I have to trade for a 10. Wait a minute, I have to trade for a 100! You need to take 100 from the 400 and add that 100 to the 60. Then take a 10 from the 160 and add it to the 3. That will make the 160 a 150.

The teacher adds to what Martin wrote on the board:




**Teacher:** Is that what you mean?

**Martin:** Yes.

**Teacher:** Let's slow down a minute because Martin combined two steps. Martin, you started to trade for a 10 and then said you had to trade for a 100. Why?

**Martin:** When I looked at the 60, I realized that I couldn't subtract the tens either without getting a negative number, so I just got a 100 and gave it to the 60.

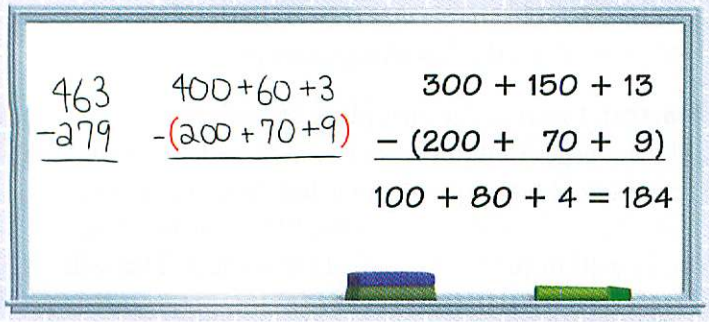
**Teacher:** Good. So what should the top numbers add up to?

**Lourdes:** 463.

**Teacher:** Who can finish the problem?

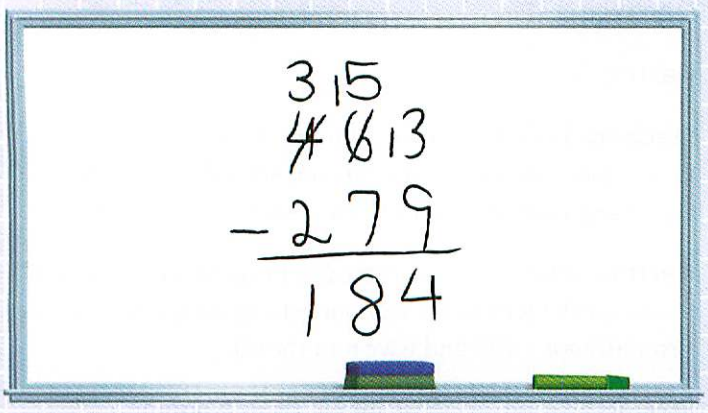
**Hana:** 300 − 200 is 100, 150 − 70 is 80, and 13 − 9 is 4. I add them all up and it's . . . 184.

The teacher adds Hana's responses to the problems on the board:




**Teacher:** What we did is separate the numbers to show how the algorithm works, but when people use the actual algorithm, they don't write out all the numbers. Let's see what that looks like. Tavon, you use this strategy often. Can you show us, using this problem?

**Tavon:** 3 take away 9 and I can't do that, I mean it's a negative, so I cross out the 6 tens and make it a 5 and then make that a 13. 13 minus 9 is 4. Then 5 − 7, I can't do that, so I cross out the 4 and make it a 3 and 15 minus 7 is 8.




**Teacher:** Hold on a second. Let's go over that. Where did you get that little 1 you put next to the 3 and what does that mean?

**Tavon:** When I crossed out the 6 and made it 5, I was taking 1 ten. Then I added 1, I mean 10, to the 3, so I had 13.

**Teacher:** So you had 63, but you made it into 50 + 13, which is still 63. Then what?

**Tavon:** Then 5 minus 7, I can't do that either, so I cross out the 4 and make it a 3 and 15 minus 7 is 8.

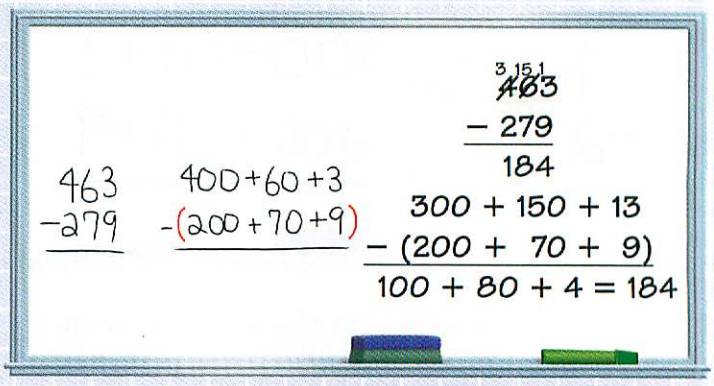
**Teacher:** 15 is really 15 what?

**Tavon:** 15 tens.

**Teacher:** So you're subtracting 7 tens from 15 tens. Does everybody get that?

**Tavon:** All I have left is 3 minus 2 equals 1, I mean 100, so the answer's the same.

**Teacher:** So if we look at what Tavon did and what Martin did, we should see some similarities.




**Teacher:** Everyone is going to try a few problems with this algorithm and try to understand the notation. If you don't like it, that's fine. But just like you are learning about other strategies you may not use, learning about this one helps you continue to learn more about different ways to think about subtraction.

The teacher encourages students to practice different strategies and notation and also stresses that sense-making is vital.