Breaking Numbers Apart for Addition

Students have has been working on the activity Combining Collections and have come together to share their strategies for solving Problem 1. The teacher has chart paper prepared for recording students' strategies. After each student shares his or her strategy, the teacher identifies the strategy by using more general terms, such as breaking numbers into 100s, 10s, and 1s, and keeping one number whole and adding the other number in parts.

Teacher: Who has a strategy that they'd like to share for 84 + 137?

Chris: I took away the 4 from 80 and the 7 from 137. So now I had to add the 80 and the 130. I took away the 100, and now I have 80 and 30 and get 110.

The teacher writes 80 + 30 = 110 on the chart paper.

Teacher: Did you do anything with these numbers you took away so you could keep track of them?

Chris: I put them in save boxes. (The "save box" is a notation that this class came up with as a way of keeping track of parts of numbers when breaking them apart.)

84 + 137

[4] [7]

80 + 130

[100]

80 + 30 = 110

Teacher: What did you do next?

Chris: I added 110 plus 100, from the save box, and now I got 210. Plus 7, so that equals 217.

The teacher writes 110 + 100 = 210 and then 210 + 7 = 217.

Teacher: You are doing a great job organizing your numbers. Is there anything you still need to do?

Chris: The 4. So 217 plus 4 equals 221.

The teacher writes 217 + 4 = 221.

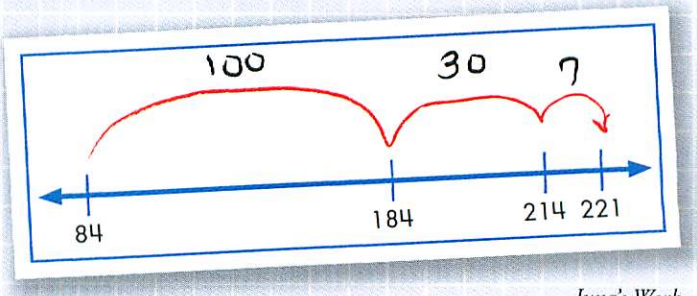
Teacher: Chris used a strategy of breaking numbers into 100s, 10s, and 1s. Then he combined the tens and added on the remaining numbers. Who has a different strategy to share?

Jung: I used a number line. Can I come up and draw it?

Teacher: Sure, Jung. Just say what you're doing while you're drawing.

Jung comes up to the chart paper, draws a line, and adds numbers and arrows as she talks.

Jung: I started at 84 and I jumped 100 to 184. Then it was 184 plus 30 to get to 214, then I jumped 7 to 221.



Jung's Work

Teacher: So it looks like you kept 84 whole and added 137 on in parts by place value.

Philip: You could add the 137 on in different ways too. Like you could try to get to 10s and 100s.

Teacher: What do you mean, Philip? Could you say more?

Philip: Well if you start at 84, you could add 6 to get to 90.

Teacher: Yes, you could add 6 from the 137. How much more would you still need to add then?

Philip: 131, because 137 take away 6 is 131.

Becky: Or you could get to 100. Then you'd have to add 16.

Teacher: Why 16?

Becky: Because 16 plus 84 is 100. I got that in Close to 100 one time.

Teacher: What if I take 16 off 137? What do I have left to add?

Kim: 121—it's 10 less than 131.

The teacher writes $137 - 6 = 131$ and then writes, $137 - 16 = 121$ below it.

Teacher: Let's say that I go with Becky's idea and add 16 to 84 to get me to 100. What should I do next?

Arthur: You still have 121 to add. You can add 100 first to get to 200 and then 21 to get to 221.

The teacher records these equations:

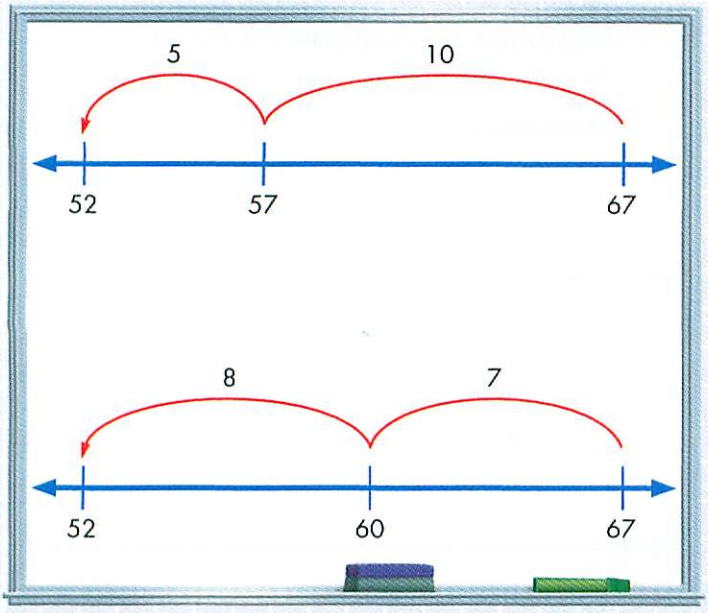
$$84 + 16 = 100$$

$$100 + 100 = 200$$

$$200 + 21 = 221$$

In this strategy sharing, students have offered examples of the two ways that third graders typically break numbers apart in order to add them: by place value or by keeping one number whole and breaking the other apart, either by place value or in parts that get to a multiple of 10. The teacher will continue to focus on these two strategies as students work on more problems in this investigation.

As the students review Jane and Kenji's strategies, the teacher records their moves on the number lines.



Teacher: All of these students figured out that Ms. Martinez is 15 inches taller than Philip, but Nicholas and Deondra used addition and Jane and Kenji used subtraction. Look at these number lines and think about why this problem can be solved by either adding or subtracting. Think about where you see the answer on each of these number lines. How does that help you understand why you can use either addition or subtraction?

Dwayne: I can see that the answer on all of the number lines is the distance between 52 and 67. That's the difference between their heights.

Kim: I agree with Dwayne. The distance is the same no matter which way you go. It's 15 if you start at 67 and subtract back to 52 and it's 15 if you start at 52 and add up to 67. Ms. Martinez is still 15 inches taller than Philip.

Teacher: I like to think about this like I do my drive to school in the morning. This morning, I drove 5 miles from my house to the school. If I drive home the exact same way, how far will I drive?

Gil: That would be 5 miles, too. It's like the travel problems. We could use addition or subtraction to solve those, too. The distance between the numbers was the same either way.

By guiding students to represent both adding up and subtracting back strategies on numbers lines, the teacher provides a visual image to help students consider why comparison problems can be solved by using either addition or subtraction. Through these representations, students can see that the difference between two numbers on a number line is the same no matter what direction one moves in. The teacher reinforces this understanding by connecting their work with comparison problems to the travel context students worked with in Investigation 3.