Dialogue Box

How Far from 100?

Adam and Bridget are playing *How Far from 100?* They are finding the largest 2-digit number they could make from the cards they have. Adam has just made the number 86 with his three cards (3, 6, and 8).

Teacher: Adam, how did you decide that this was the largest 2-digit number that you could make?

Adam: You want the biggest number that you have in the tens place and the second-biggest number in the ones place. The tens column is the biggest.

Bridget: If you make 86, that's 8 tens and 6 ones, but if you make 68, that's only 6 tens and 8 ones.

Adam: Another way to think about it is how many ones are in the number. It would be 68 ones if I made the number 68 and the other way there are 86 ones.

Teacher: What strategies are you using to figure out the difference between 86 and 100?

Adam: 86 plus 4 is 90 and 90 plus 10 is 100. Four plus 10 is 14, so the difference is 14.

Teacher: That's great, Adam. Is there another way that you could figure this out, maybe using combinations that you know that add to 100?

Adam: I could use 85 plus 15. Then I could subtract 1 from the 15 and add it to the 85 to get 86 plus 14. Or I might look at it like 90 plus 10 and subtract 4 from 90 and add 4 to the second number. That makes 14, how far it is from 100.

Bridget has the numbers 2, 3, and 4. Without hesitating, she makes the number closest to 100.

Bridget: I made 43.

Teacher: What made you choose which number to put in the tens place and which to put in the ones?

Bridget: Four is the biggest number and 3 is the second biggest number and that makes 43. Then I added 7 to 43 to get to 50 and 50 more to get to 100.

Teacher: So what is the difference between 43 and 100?

Bridget: 57.

After moving on to observe other students, the teacher returns to Adam and Bridget. They have each made the smallest 3-digit number they could.

Teacher: What 3-digit numbers did you make to be as close to 100 as possible? How did you decide which cards to use?

Adam: I made the number 136. My smallest number is 1, so I knew that had to go in the hundreds place. Then you want the next-smallest number in the tens place and the next-smallest in the ones place. That gave me 1 hundred, 3 tens, and 6 ones.

Bridget: I did the same thing as Adam, but I got closer to 100.

Teacher: What do you mean when you say you did the same thing as Adam?

Bridget: I used the 1 in the hundreds place. Then I knew that I needed to use the next-smallest number in the tens place and the next one in the ones place. I got closer because I have a 2 card, so I made the number 123.

Teacher: If you picture 123 and 136 on a number line, which is closer to 100? How far from 100 is Bridget's number? How far is yours?

Adam: Bridget's right. Her number is only 23 away and mine is 36 away. Hers is 2 tens and 3 ones away and mine is farther because it's more than 3 tens away. But guess what? I still won the round.

Teacher: Can you explain how you know that?

Adam: My 2-digit number was 86 and that was only 14 away from 100. That's closer than 23 away.

Teacher: Bridget, do you agree with that?

Bridget: Yes—my 2-digit number was really far from 100. It was 57 away, so Adam got closer.

As the teacher questions Adam and Bridget, she encourages them to articulate their strategies for finding numbers that have the smallest difference between each one and 100. This allows her to assess their understanding of the value of each place in 2- and 3-digit numbers. Both Adam and Bridget demonstrate understanding that to make the largest 2-digit number, they must use the largest digit in the tens place and the next-largest in the ones place. They also demonstrate understanding that the inverse is true when making the smallest 3-digit number. The teacher's questioning also allows her to assess Adam and Bridget's strategies for determining the difference between each number and 100.