Addition and Subtraction Grades K–1
Transcript

Kindergarten Teacher: I am excited that we have been given time to talk about the vertical connection between the kindergarten and first-grade addition and subtraction TEKS.

First-Grade Teacher: I agree. Let's take a minute to review each other's grade-level student expectations. Here's the vertical alignment chart I printed from texasgateway.org.

Kindergarten Teacher: (*Looks at vertical alignment chart*) I can definitely see the vertical connection. Many of the concepts developed in kindergarten are extended by moving from working with numbers within 10 to working with numbers within 20 in first grade.

First-Grade Teacher: Since there is a connection, how about we use this time to talk specifically about some of the models we are using to teach addition and subtraction?

Kindergarten Teacher: Sounds great. How should we start?

First-Grade Teacher: What are some of the models you use with your students?

Kindergarten Teacher: The students use different types of counters to model a problem, solve it, and explain how they solved the problem. In our classroom, we often use counters of some sort with a story mat or a double ten-frame mat.

First-Grade Teacher: Could you show me how you use the double ten frame in kindergarten to model and solve a problem, so we can find connections between the grades?

Kindergarten Teacher: Sure. I left what we were working on in class on the table here in case we wanted to talk about it. (*Points to problem*) Here is a typical joining problem I am asking my students to model and solve. "Claudia has three yellow marbles. Her friend gives her six blue marbles. How many marbles does Claudia have now?" Most of my students modeled the problem by placing three cubes on one ten-frame mat to represent the yellow marbles Claudia had.

Then, they placed six cubes on the other ten frame to represent the blue marbles her friend gave her. The students would join the blue cubes with the yellow cubes on the top ten frame. The different methods that students used to determine the solution to the problem are fascinating.

A few students counted each cube to determine the total number (*Starts counting*): One, two, three, four, five, six, seven, eight, and nine. A lot of my students used a counting on strategy. They knew there were three yellow cubes, so they began counting forward from three to determine the total number: (*Starts counting*) Three, four, five, six, seven, eight, and nine.

First-Grade Teacher: It's good to see students progressing to counting on instead of counting all. I have a question. Have any of your students considered counting on from the larger number, from the six blue marbles Claudia's friend gave her?

Kindergarten Teacher: A few—it does require a deeper understanding of addition to know that I can change the order in which I add the numbers and still get the same sum. As they encounter more situations and solve problems, they will become curious about order and if it matters.

What I often see is the students using the ten frame to help them determine the sum.

Several students can look at the arrangement of the cubes that have been joined together

and instantly know that there are nine cubes, because there is one empty space on the ten frame and nine is one less than 10.

First-Grade Teacher: Yes, and a student might look at this ten frame and see this as a row of five and a row of four that, when combined, equals nine.

In looking at a ten frame, they see that 3+6=9, as does 5+4. This supports the concept of composing and decomposing numbers, which is in the student expectations for both kindergarten and grade one. Describing and seeing the relationship in more than one way helps students develop flexibility when adding and subtracting two numbers. Hmmm. What would this look like if the sum was larger than 10, like in first grade? Let's change this problem to eight yellow marbles and five blue marbles.

Kindergarten Teacher: Let me model that on the double ten-frame mat.

First-Grade Teacher: I like using the double ten frame because it helps my students think about how many more cubes they need to add to the top ten frame to make 10. They can see that they have two empty spaces, so by moving two of the cubes up, they can make 10.

The students can instantly see that they have 10 and three more, which is 13. This visual builds the understanding of making a 10 when adding two numbers.

To help students begin to use mental math to make 10, I need to bridge their understanding from the concrete to abstract by writing the corresponding numbers and operation.
In second grade, students should be able to determine the sum automatically.
These activities help lay the foundation of automaticity.

For example, to solve this problem I would add eight and five, so I would write 8+5. Notice that the five blue cubes have been decomposed into a group of two and a group of three. I can make the connection between the group of two cubes and the group of three cubes by decomposing the five into two and three.

Now, we need to think about which two numbers, when composed or combined, make 10. Based on our model, we know that eight yellow cubes and two blue cubes fill the ten frame, and therefore make 10. So, I can show composing the eight and the two to make 10. Then, all I need to do is record the sum of 10 and three, which is 13.

Kindergarten Teacher: Would that same idea work for subtraction?

First-Grade Teacher: Yes, but instead of making a 10, we can decompose a number leading to a 10. Let's use the strategy for 14-6.

Kindergarten Teacher: Let me see if I can explain the thinking involved using the cubes and the double ten frame. Look, when I use a double ten frame, 14 is already decomposed into a group of 10 and a group of four.

Although in kindergarten we only find differences within 10, we would definitely represent the number 14 as a part of our student expectations. The work in kindergarten will give your students prior knowledge of how the number looks when represented on a ten frame.

First-Grade Teacher: You are so right. The representation of 14 as a group of 10 and four more really pops with the double ten frame.

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Kindergarten Teacher: Okay, now back to our example. I could start by subtracting the four cubes on the bottom ten frame. Then, I need to continue counting back until I remove a total of six cubes, so five, and six. Okay, I know the answer is eight, but how would you record the thinking you just shared?

First-Grade Teacher: There are several ways to make our thinking visible, so let's look at one way. When you put 14 cubes on the double ten-frame mat, it shows 14 decomposed into a group of 10 and a group of four.

By using the mat, you were able to quickly remove four cubes from the bottom ten frame to make a 10, since we can decompose six as a four and a two. We need to show removing or subtracting four from 14 to make 10. Next, you continued counting back from 10 and took off two more cubes. We need to show subtracting two more to get to six cubes being removed. When we remove that last two of the six, we are left with eight.

Kindergarten Teacher: Okay, I see. Is the goal in first grade to have students show their thinking every time they solve a problem?

First-Grade Teacher: No, this is only a way to get students to visualize and become proficient at making 10. Ultimately, students will learn to do this mentally. Some students may even start to recall that 14-6=8. We don't want to discount these steps toward automaticity, which is expected by the end of second grade.

Kindergarten Teacher: That makes sense. Next time, can we share other models that we use?

First-Grade Teacher: Absolutely!