Strategies for Learning Difficult Facts

In Session 2.1, this class is discussing how to use multiplication facts they know to find the product of more difficult facts. The teacher displays the expression 8×7.

Teacher: A lot of you have this fact on your "working on" lists. Keisha and Oscar were saying they have a hard time remembering if the product is 54 or 56 or 58. Who has clues they are using to work on 8×7?

Derek: 5×7 is 35, and then you just need 3×7.

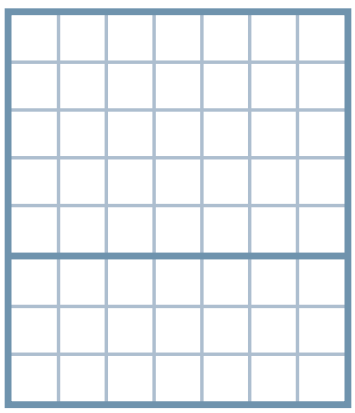
The teacher writes $(5 \times 7) + (3 \times 7)$ on the board.

Derek: You just combine them. It's 35 plus 21, and that's 50 and 6, so you know it's 56.

Teacher: So Derek thinks that 5×7 plus 3×7 is the same as 8×7. Who can suggest a representation of some sort or a story problem that would show that this is true?

Jill: I have a way. You could do an array for 5×7 and then just add another 3×7 array on top of it. Then you have 8 rows of 7. You can count the rows.

The teacher displays the arrays as Jill explains. She also shows how to put together a 5×7 Array Card with a 3×7 Array Card to make an 8×7 array.



Teacher: What about a story problem? Who could tell a multiplication story that would help us see how 5×7 can help with figuring out 8×7?

There is a long silence, so the teacher makes a suggestion.

Teacher: Remember when we talked about bags of apples? What if we wanted to have 8 bags with 7 apples in each bag? How could knowing $5 \times 7 = 35$ help us figure out the total number of apples?

Richard: 5×7 would be 5 of the bags, so 35 apples in 5 bags. But you still have 3 more bags, so, that's, um . . . [Richard trails off and seems to have lost track.]

Teacher: How about if I draw this so everyone can see it? So here are 5 bags with 7 apples in each, and Richard says we need 3 more bags. So, without drawing the rest of the bags, who can continue what Richard started?

Cheyenne: It's just 3 more bags with 7 in each. So that's another 21, and you just add it.

Jake: I know 10×7, which is 70, you can do that and minus 7s, or just minus 14.

Teacher: That's an interesting one. Jake says you can start with 10×7, which is *more* than 8×7, and then subtract 7s. Who can come up with a story that would help us with this one? You could use the bags of apples again or something else.

Alejandro: I know. It's like if you have 8 tables in the cafeteria, and there are 7 kids sitting at each table, and you want to know how many kids. If you had 10 tables, that would be 70 kids, but you have to take away two of the tables. So 70 minus 7, minus 7.

Anna: You could also do 8×5. It's an easy one for me cause 8 fives is 40. Then you just add 8s to it.

Noemi: You could skip count and start at 8 × 2 or start from 0 . . .

Anna: But you can start at 8 × 5 and keep skip counting. That would be quicker.

Teacher: Who can explain in their own words what Anna is saying about 8 × 5 and then skip counting by 8s. How would that work? Elena, you look like you don't agree or you have a question.

Elena: I don't get what she's saying because first she's saying 5s and then she's saying 8s. You can't just start counting by 5s and then switch to 8s.

Anna: No, it's by 8s. I'm just thinking of *seven eights* instead of *eight sevens*. I just turn it around.

Murphy: I get what she's saying. She's thinking 7 groups of 8. Then she can start with 5 × 8, and she needs 2 more 8s.

Teacher: So, Anna is using the idea we've worked on before that you can switch the factors around, but you're still going to get the same product.

These students are effectively using multiplication facts they know to solve more difficult problems and are on their way to developing fluency with the basic multiplication facts.

The teacher wants students to get in the habit of using representations and stories as they reason about multiplication. Even though some students are able to reason about the numbers without referring to pictures or story problems, she knows that there are other students who need to ground their thinking in such representations.

She also knows that later in the year, as students work with breaking apart multiplication problems with greater numbers, many of them will need to have visual images to help them keep track of the parts of the problem. By creating pictures, diagrams, or story contexts while they are learning their facts, they are developing the habit of using these tools to help them reason about multiplication.