Multiplication Strings

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District: New York Community School District 2

Grade: 4

Teacher: All right, let's start with this first one. Thumbs up, 8 times 4. Thumbs up if you know it, 8 times 4. Uh, Ambrese? *(8 x 4 = _ is recorded on the chalkboard.)*

Student: 32.

Teacher: Okay. How'd you know it? *(32 is recorded as the product of 8 x 4.)*

Student: First cause I counted by 4s.

Teacher: And what did that sound like when you counted by 4s?

Student: 4, 8, 6…wait, 6… *(The sequence of numbers is recorded on the chalkboard.)*

Student: 12.

Student: 12, 16, 20, 24, 28, 32.

Teacher: Okay. Anyone else know it a different way? Zina?

Student: I added 8 and 8 is 16, then I added 16 plus 16 equals 32. *(8 + 8 = 16 and 16 + 16 = 32 is recorded on the chalkboard.)*

Teacher: So you knew 8 plus 8 is 16, and then 16 plus 16 equals 32. Okay, great. Um, next one. You thinking about it? Thinking hard? Uh, Nicholas? *(8 x 8 = _ is recorded on the chalkboard.)*

Student: 64. *(The product of 8 x 8 is recorded.)*

Teacher: And how'd you know that? Could we have all eyes on Nicholas when he's speaking, so you can listen in to his thinking?

Student: Cause I knew that 8 times 4 would be 32.

Teacher: Okay, so let me show you that. If I had to draw an array, like we've been working on in multiplication, I would draw it like this, right? 8 times 4, just like all of our posters have and all your array cards, 8 times 4 is 32. *(An 8 by 4 rectangular model is drawn and the dimensions of 8 and 4 labeled. The product 32 is recorded in the center of the rectangle.)*

Student: And then plus 32 and then equals 64.

Teacher: And so then you doubled that, you put on another 32. Four more groups of 8 equals 32, and when you add that together it's 64. Cause those are 8, times 8, is 64. Neat. Did anyone else have a, um, way of thinking about it? Um, Allison?

Student: Count 8 eight times.

Teacher: Okay, so you used the skip counting. I wanna go back to, um, what Nicholas explained about his strategy. Could anyone put into their own words what Nicholas did when he was solving this problem? Who put that into their own words? Again, all I need is the thumbs. Um, Jasmine, try to put it into your own words.

Student: It seems like he added 32 plus 32. Cause he knew that, um, 8 times 4 was 32. So he just had to add another 4 and he, he just did 32 plus 32.

Teacher: So he already knew that 8 times 4 is 32, and then you said he added another 4? Isn't 32 plus 4, 36? *(8 x 4 = 32 is recorded on the board.)*

Student: He added, no he added like another set of…I mean he, yeah, he added like another…

Student: …set of 4…

Student: yeah, set of 4…

Teacher: So he added another set of 4s.

Student: No he added, yeah. And that, he probably did 8 times 4 two times, probably.

Teacher: He did do 8 times 4 two times. *(Points to the dimensions of the open area model.)* And that's what that array shows us. We started with the 8 times 4 is 32.

Student: Then, like, he probably added the 32…

Teacher: Exactly. Four more groups of 8 is 32 and that equals 64 altogether. *(Points to the dimensions of the second rectangle.)* Hmmm, if this is this, what would this be? 8 times 16. Thumbs, thumbs. *(8 x 16 = _ is recorded on the chalkboard.)*

Student: Oh, I know.

Teacher: Oooh, Muhammed.

Student: 128.

Teacher: 128! How'd you get that?

Student: Um…

Teacher: Let me erase something. How'd you get that, Muhammed?

Student: I add 64 plus 64.

Teacher: So you got 128 by adding 64 and 64 together to equal 128. *(128 is recorded as the product of 16 x 8. Teacher points to the product of 8 x 8 = 64.)* My question immediately is going to be why? How'd you know to do that?

Student: Because I…I…I noticed that 8 plus 8 equals 16…

Teacher: Okay, so you took the 16 and…

Student: And then…

Teacher: Hang on a second, and you thought of that as being 8 plus 8. Great. *(8 + 8 is recorded on the chalkboard.)*

Student: Yeah, and then…and then, um, when I saw it's 16, I just plus it again. I plussed the 64 again. Plus I noticed…I noticed that is plus, um, 8 more, and then I just plussed 64 plus 64 equals 128.

Teacher: How many people followed what Muhammed was just saying? Did you hear what he said? Polina, did you listen in?

Student: Yeah.

Teacher: Okay, can you say it really loudly and slowly?

Student: Muhammed said that, uh, he knew that, um, 8 times 16 equals 128, uh, because, before that, he saw that 8 times…8 plus 8 equals 16. And, uh, and that's the second number. And uh, if 8 times 8 equals 64…

Teacher: Okay, slow down. So if 8...we know that 8 times 8 equals 64, cause we saw that up here, 8 times 8 is 64. Okay. *(An 8 x 8 square is drawn and the dimensions are labeled. The product of 8 x 8 is noted in the center of the square. The teacher points to the previous area model showing 4 x 8 and 4 x 8.)*

Student: And now, um, he adds another 64.

Teacher: Now he adds on another 64 because before he said, "Well, I know 16 has 2 groups of 8, so 8 times 8 is 64 here. One more group of 8 times 8 is 64," and Muhammed, how much is this 8 plus 8 up here? *(Another 8 x 8 square is drawn and connected to the previous 8 x 8 square. The teacher points the multiplication equations written previously (8 x 8) and then records the dimensions of the square and writes the product 64 in the center of the square.)*

Student: 16.

Teacher: There's your 16. So if 8 times 8 is 64, and another 8 times 8 is 64, 16 times 8 is…add those together, 128. Okay? Yes, Joseph? *(The teacher points to the 8 and 8, connects the 8s and writes 16 over the amounts.)*

Student: Um, I was looking at 8 times 4, 8 times 8, and 8 times 16. There's a pattern.

Teacher: Oh!

Student: Because every time we started out with 32, and then went with 64, and there was another 32, and then we went with 64, and there was another 64. So…

Teacher: Say more.

Student: Every time you add, it's the number before, you answered.

Teacher: Yeah. Adrian, did you want to say something about that?

Student: No, I wanted to say another pattern.

Teacher: Let's focus on what Joseph was just talking about with his pattern. He's noticing, guys look up here, look at these numbers, everyone. Joseph is noticing something about 32 and 32 more is 64 and then 64 and 64 more is 128. *(The teacher points to the product of each of the equations.)* He's noticing something happening with these numbers. Let's really, let's spend some time thinking about that.

Eyes back this way. I listened in on a couple of conversations. Um, Jeffrey and Aaron, I'd like you, cause I listened in to your conversation, I'd like you to share what you notice is happening with these numbers.

Student: We noticed that, the um, the questions are doubling…

Student: …and the answers.

Teacher: To end this string, I heard someone say, "I know what would come next." What do you think would come next in this number string from the 8 by 16, if I use this doubling? Think about that for a second.

So the big idea, guys, put your thumbs down, let's listen in to this big idea, cause we're gonna follow this as we're working with our arrays. We have this big idea going here, that if one factor doubles, this one's staying the same the whole time, but if this one factor doubles, the answer's gonna double. *(The teacher points to the factors in one equation as she talks about doubling the factor she then points to the product of the next equation in the string.)*

[End of audio]