MELISSA NIX: What are the dimensions of this figure, if you know the area is 3*a* squared plus 3*a*? And, by the way, there are many answers to this. And so if you can come up with one, see if you can come up with two. And then we'll share some about in a second. Do you have a clarifying question? Yeah?

STUDENT: Does it have to be a rectangle?

MELISSA NIX: Um, it doesn't have to be a rectangle. It doesn't have to be a rectangle. Uh, for sake of my examples in here today, because our next lesson is going to go into rectangles, I'm gonna have the first few that I share up be rectangles.

Go ahead and do a little private think time on your own, and see if you come up with, and I will let you know in about a minute when you can turn to your partner and check.

STUDENT: [inaudible] was squared but [inaudible]

MELISSA NIX: Is it? What makes ... How do you know that 3*a* times 3*a* equals 3*a* squared?

STUDENT: Um, because 3 times 3 is 3 squared, right? Or *a* times *a* could be a squared?

MELISSA NIX: It seems like you're thinking it through a little bit more. What would 3 times 3 give you?

STUDENT: 9.

MELISSA NIX: So is …

STUDENT: Mm-hmm. [affirmative]

MELISSA NIX: ... 9 in your answer at all?

STUDENT: No.

MELISSA NIX: Would it have to be if ...

STUDENT: Yes.

MELISSA NIX: Hmm. So what modifications can you make if you want your area to be 3*a* squared …

STUDENT: Hmm?

MELISSA NIX: ... but yet it's not working to have two 3*a*'s. I'm gonna come back and see what you go with that.

STUDENT: I think she said [inaudible].

STUDENT: I don't know.

MELISSA NIX: Go ahead and turn to your partner and think about, talk about what you were thinking.

STUDENTS: [crosstalk]

MELISSA NIX: Share your thinking with one another and see if together you can move your thinking forward.

STUDENT: ... *a* squared and *a* on the top, and then I did 3. So then it goes 3 times *a* squared to be 3*a* squared along, and then 3 times *a* is 3.

STUDENTS: [crosstalk]

STUDENT: Having *a* squares but this time it's going to be 3, because it's 3*a*. So you, you just have to make it so there's 3*a* squares.

STUDENT: If you make this sideline radical 3 and this sideline radical 3, then this is 3, multiple 3*a*, and then it'll go 3*a*. It says 3*a* squared. And if you made this length radical 3*a* and this length radical 3*a*, then this was also 3*a* squared.

STUDENT: Ah, [inaudible] that last one.

STUDENT: But what is square units?

STUDENT: Just ... square, I assume.

STUDENT: Square?

STUDENT: Well it's just the units, isn't it?

STUDENT: I don't know that [inaudible] square--

MELISSA NIX: Knowing that the 3*a* might have come from *a* and *a* and *a*, this person said *a* and *a* and *a*, by *a* [laugh], must be three *a* squares. What do you think of that? Does that feel right to you? *A*, *a*, *a*. Do you agree that that's 3*a*?

STUDENT: Mm-hmm. [affirmative]

MELISSA NIX: By *a*? So I got *a* squared, *a* squared, and *a* squared. Love the fact that this person put down what they're thinking, and then said, "I want to know this next piece." What does the question say up here? Will you all read it with me? Where does 3*a* come in?

STUDENTS: Where does 3*a* come in?

MELISSA NIX: Where does 3*a* come in? How is this similar to the one we just saw? How is this similar to the one we just saw? What's the same? And, so, what's the same as this one and the one that we just saw.

STUDENT: Well that, um, there are three *a* squares.

MELISSA NIX: All right. So again, is the left side *a* and *a* and *a*?

STUDENT: Yes.

MELISSA NIX: Is that the same?

STUDENT: Yes.

MELISSA NIX: Does this one answer that question? Where's the 3*a* coming from in this model? Where is the 3*a* coming from in this model? Do you all see where the 3*a* is coming from in this model?

STUDENT: Mm-hmm. [affirmative]

MELISSA NIX: Brisa, do you see where the 3*a* is coming from in this model?

STUDENT: Yeah.

MELISSA NIX: Can you explain to me where the 3*a* is coming from in this model?

STUDENT: [inaudible]

MELISSA NIX: How did they get the 3*a*?

STUDENT: Because 1 times 3*a* is 3*a*.

MELISSA NIX: So there's a little bit of a glare, but the top half of this rectangle looks like it's *a* and 1. And this left side of the rectangle is 3a. So 3*a* by *a* would get me, I -- 3 *a* squareds, and 1 would get me 1. What math would I want to articulate that this is a 1? Think back to what Mason was telling us earlier about that connection with that multiplication problem. What math is letting me see that this is *a*, and what is this, multiplication up here?

STUDENTS: [crosstalk]

MELISSA NIX: What math would that be?

STUDENTS: Addition.

MELISSA NIX: Addition, okay. This one is slightly different. Did we answer your question, where the 3*a* came from?

STUDENT: Yeah. [inaudible]

STUDENT: Uh-huh. [affirmative]

MELISSA NIX: Check out this one. Is this the same answer or is this a different approach? This one also simplifies to 3*a* squared plus 3*a*, but this person approached it differently. Do we agree with this math? What happens when 3 and a squared come together and multiply?

STUDENTS: 3a squared.

MELISSA NIX: What happens when 3 and *a* come together and multiply?

STUDENTS: 3*a*.

MELISSA NIX: Joseph, do you agree? Is this the same one?

STUDENT: Yeah.

MELISSA NIX: So if you were to write an expression for this one, what expression would you write? What are they multiplying?

STUDENT: They're multiplying 3 times *a* squared and then 3 times *a*.

MELISSA NIX: They're multiplying 3 times *a* squared and then 3 times *a*? Is there only one way to write that? Or can I write that 3 times *a* squared and 3 times *a*, and you said, "and." Do I need to, mathematically, show what “and” means?

STUDENT: [inaudible]

MELISSA NIX: What would I need to put in here?

STUDENT: Addition.

MELISSA NIX: Addition?

STUDENT: Yeah, addition.

MELISSA NIX: Is there another way I could write that same expression? Let's think back to what Mason said about that whole math problem, that 10 and 2 and 10 and 5, right? What do you think, Heaven?

STUDENT: 3 times *a* squared plus *a*.

MELISSA NIX: 3 times the quantity of *a* squared plus *a*? Are those equivalent expressions?

STUDENT: Mm-hmm. [affirmative]

MELISSA NIX: Okay. One more model to show. So this one might be articulating again, where that 3*a* is coming from. But I see that this has been compartmentalized here, or sectioned off. How many units do we now have?

STUDENTS: Three.

MELISSA NIX: Three. So this was *a* by a, which got me …?

STUDENT: *A* squared.

MELISSA NIX: *A* and *a* is?

STUDENT: *A* squared.

MELISSA NIX: *A* and *A* is?

STUDENTS: *A* squared.

MELISSA NIX: *A* and 1 is ... 1*a*, right? *A* times 1 is?

STUDENT: 1*a*.

MELISSA NIX: 1*a*. And *a* times 1 is …

STUDENTS: [inaudible]

MELISSA NIX: 1*a*. So adding those up, you got three *a*'s and 3*a* squared. All right.