

MALLORY WILLIAMSON: Are you guys ready for Act 3?

STUDENT: Yes, ma'am.

MALLORY WILLIAMSON: Which—One of the things I'm talking to the other group about is that volume is not just the formula, okay? We're used to plugging in a formula, length times width times height and being done, all right? But what's harder is when you see the front of this box, what's behind it?

STUDENT: [inaudible]

MALLORY WILLIAMSON: Yes, you do.

STUDENT: It's 11.

STUDENT: Other sugar cubes.

MALLORY WILLIAMSON: Other sugar cubes. Thank you. There's other sugar cubes behind it, right? And before he put in that last one, you could kind of see all the other sugar cubes. All right, so when you take away this first layer, how many is going to be behind that first layer?

STUDENT: More.

MALLORY WILLIAMSON: Eighteen more. And when you take away that second layer, how many is going to be behind it?

STUDENT: Eighteen more.

MALLORY WILLIAMSON: And when you take away that third layer, how many is going to be behind it?

STUDENT: Eighteen more.

MALLORY WILLIAMSON: Okay, so, how could I show that to somebody who's looking at our picture?

STUDENT: You have to multiply it by a number.

MALLORY WILLIAMSON: Which we did, right? You guys said that the height was what?

STUDENT: Two hundred and sixteen. I mean 12.

MALLORY WILLIAMSON: Twelve. So, how can we show them 12 layers of 18?

STUDENT: We multiply 18 times 12.

MALLORY WILLIAMSON: We did already, which is 216. How can we visually draw a picture to show that we think there's 12 layers of 18?

STUDENT: Why can't we do that in Act 1?

MALLORY WILLIAMSON: I don't want Act 1. I want Act 2. How can I show 12 layers of 18?

STUDENT: You can draw in a summary.

MALLORY WILLIAMSON: I'll be right back.

STUDENT: How can you show that?

STUDENT: Right there. You can just draw, like, 18 more, 18 more, 18 more.

MALLORY WILLIAMSON: Yeah. Yeah. And if you want, you can use the side space, you can use the grid, or if you want, you can create your own array of 18. Okay? So, what I'd like to show is in our minds, what we're thinking about is 18 layers 12 times, or eight—excuse me, 12 layers of 18. And so, when we do that, we want to draw a visual to represent that. Okay? So go ahead and work on that before I give you Act 3. All right? And like I said, you can use my grid paper or you can decide to draw your own visual of 18, okay?

STUDENT: How do you want to do that? We're using red and blue.

MALLORY WILLIAMSON: To a degree. Because, was it 18 by 1, or not?

STUDENT: Here, you wanna help?

STUDENT: Come down here.

STUDENT: Thank you.

MALLORY WILLIAMSON: It was six by three.

STUDENT: Oh, six by three.

MALLORY WILLIAMSON: Six by three.

STUDENT: I was thinking of that.

MALLORY WILLIAMSON: Can you explain this part?

STUDENT: Um, what we are doing is, we were taking three for the—

STUDENT: We're technically drawing this, but like 3D to, like, show all of the sugar cubes that are in here, but, like, it's laying flat, is it, over here. Like, you took off the cover and you just make it flat. You show like the nine sugars it looks right now. It's the nine sugar cubes tall and then the, the three right here and then the six for like up here.

MALLORY WILLIAMSON: Around the whole cube. Nope. That's only six by two. One, two, three, four, five, six. We have to go as a height of three. Yeah. So it'd be around here. There you go. So we got—You guys thought the height was five, correct?

STUDENT: Yes.

STUDENT: Yeah.

MALLORY WILLIAMSON: So, we've got to do it one more time. So, this is a more accurate model than doing 18 by 1, because we didn't fit 18 by 1 sugar cubes in that box.

STUDENT: No.

MALLORY WILLIAMSON: Okay. That would be a very tall, skinny box. So, when we draw a model, we want to try to draw in layers or as accurate as possible. Okay? All right. Let me give you the last act.

MALLORY WILLIAMSON: There's the last act.

STUDENT: That's our last act.

STUDENT: I don't know how to explain this.

STUDENT: Do you want me to glue it, or do you want to glue it?

STUDENT: Okay, so you—Wait. Wait. Wait.

MALLORY WILLIAMSON: Doing this down here and working on this part, okay?

STUDENT: Okay. Um, um, how did you know I didn't wanna glue? I haven't glued yet.

STUDENT: I haven't glued yet too.

STUDENT: I haven't wrote yet.

STUDENT: How do you know I don't wanna do it? I never root it.

STUDENT: I will root it.

STUDENT: You said you wanted to work.

MALLORY WILLIAMSON: Okay. Christopher, can you do me a favor, please, and sit up all the way to your desk? Thank you. Okay. Glue that down while the girls are working on that. Okay. So, what are we putting in here? Just the number?

STUDENT: No, the drawing.

MALLORY WILLIAMSON: Well, I will tell you, it's going to be a little bit harder because when we talk about six times three and then the height, that's a three-dimensional model. So, to make it easier, I would just write 18 so that the person can see that you have 10 groups of 18. Okay? All right, Christopher, so you and Angel can work on this one together. So do me a favor and sit up, okay? So now—Now, on your bottom piece, we were given this new information, how can we take this information and find the solution?

STUDENT: We sum up each number.

MALLORY WILLIAMSON: Sit on your bottom please, because you're just talking to me, okay?

STUDENT: Put 11 down, 6 across.

MALLORY WILLIAMSON: What does down mean? Like what—Is there a mathematical term we can use?

STUDENT: Three—I mean, 11 up and down.

MALLORY WILLIAMSON: What do we call that, when we're measuring up and down?

STUDENT: Rows and columns.

MALLORY WILLIAMSON: It could be 11 columns, but we're applying it to volume, we call—We call it height.

STUDENT: Yeah.

MALLORY WILLIAMSON: So height is 11.

STUDENT: The height is 11.

MALLORY WILLIAMSON: Or in this case it could be the length because of how long it is. Okay. At least you two can work on the rest of this and then we'll finish up on this, okay?

STUDENT: Three.

MALLORY WILLIAMSON: Okay. When—As soon as we saw that image, what do we start doing?

STUDENT: Oh, we got, we got—

MALLORY WILLIAMSON: We did 18 times 11.

STUDENT: Because there's 11 right here and then there's 18 right there.

STUDENT: Six times three is 18.

MALLORY WILLIAMSON: So, what vocabulary word, vocabulary term, do we call this 11?

STUDENT: Length.

MALLORY WILLIAMSON: We could be calling it the length. Okay. It just depends on how you look at the box, because in this perspective, it is the width, like how wide it is going backwards. But you can call it the length. Okay? You can also call it the height because if I were to stand the box upright, that would be how tall it would be. Okay? So we did 18 times 11 or 3 times 6 times 11. So let's do that first. [OVERLAPPING] Guys, please speak to each other properly, don't just—

STUDENT: So we do 18 times 11 or—

STUDENT: Yeah.

MALLORY WILLIAMSON: Right. So this will be 198.

STUDENT: The ratio is six by three, so 18 times 11.

MALLORY WILLIAMSON: 198.

STUDENT: 198.

MALLORY WILLIAMSON: But something that's important to understand is that you're actually finding, also, the layers of something that can fill up that space. We want to understand how we calculate volume instead of just following a simple formula and plugging it in and multiplying it, okay? So when you find a space, you could do a lot of repeated addition. So you could take 3 and times it by 11. So what's 3 times 11?

STUDENT: Three times 11 will be 33.

MALLORY WILLIAMSON: It would be 33. So I could technically take this box and say 33 plus 33 plus 33 plus 33 plus 33. Or I could do what you guys did when we just see the front of it, 18 plus 18 plus 18 plus 18 plus 18, and keep going 11 times. So there's several different ways to calculate a volume instead of just following the formula. Okay? So I think you guys did a great job communicating with each other figuring out that. So in the long run, do you think your estimate was close the first time around compared to the end?

STUDENT: No.

MALLORY WILLIAMSON: So, sometimes it helps to actually go through it and say, "Hey, oh, I was not close, but that's okay. I now know that, that box has about 200 cubes in it. So when I go shopping, if your mom needs sugar for whatever reason, you can say, hey, that has about 200 cubes in it. You'll impress her with that. All right. Thank you, guys. And you can just put your final recording, 198 sugar cubes. Because your original estimate was 60.

STUDENT: Oh, I thought—

MALLORY WILLIAMSON: Yeah. This one was close. And I think that's important to understand what—it's hard to estimate when you just look at something. But the more information we find out about it, it's easier to understand, okay, we can actually edit our estimate and get closer to the actual answer. Okay? One thing I want to point out is there are several ways to find volume. So instead of plugging in a formula, was that the very first thing that we did was just multiply length times width times height?

STUDENT: No.

MALLORY WILLIAMSON: No, we didn't. If we did that, we'd be over with this task like that. So a lot of it has to do with layers that take up space. And it all depends on what you see and what you don't see. Because a lot of these layers, sometimes you're going to notice, are going to be hidden. Okay? What do you guys—I want you guys to talk about, is there another way you could have found the volume of this instead of doing length times width times height?

STUDENT: We could add—we could divide 198.

STUDENT: That would be checking our answer; that wouldn't, like, give us the answer.

STUDENT: That's because we already know the answer. We have to know the answer in order to do that.

STUDENT: We could draw models.

STUDENT: Of what?

STUDENT: That's true.

STUDENT: We could have drawn models. We could draw eleven model, and then—Or six models, and then do 13.

MALLORY WILLIAMSON: Okay. If you would return to your seats, please.