ANTOINETTE VILLARIN: Before we start, I want to talk a little bit about learning goals and what practices we're going to be practicing today. So up in the front where we have objective, our goal today is going to be for mathematicians to be able to interpret parts of a graph in a real-life situation. Okay? So we've also already been looking at situations and what that might look like in your table, what it might look like in your graph, and what it might look like in your equation. Okay?

And we've also been looking at things like rate of change and slope. Those are parts of the graph that we're going to interpret in another real-life situation. Okay? But I'm going to add to that. And another thing that mathematicians do that we're going to practice today, is to build an argument to justify our reasoning, okay? So we're going to practice that and by the end of the today, you're going to be really good at building an argument, and using vocabulary that we use in a math class to kind of back up that argument. Okay? Up here are math practices that I've had all year for you. There's a couple that we're going to focus on, okay?

The first math practice that we're going to focus on is making sense of problems and persevering when solving them. Okay? Later today you're going to get a task and you and your partner or your team of three will work on it and try to make sense of it, and really persevere. Okay? The other one that we're going to really focus on today -- we're going to focus on all of them -- but the one that I want to highlight also is critiquing the reasoning of others: constructing your own argument and practicing how to critique the reasoning of others. Okay?

And then the other two are six and seven: attending to precision and being really precise in your language but also in your math, and looking for and making use of structure. So if you remember when we were looking at rates of change, we were looking at that structure and all four representations, and you're kind of going to use that knowledge to help you. Are there any questions? No? Okay?

So here is the lesson, okay? And it starts with something called flowing liquid. Okay? So up here we have something called a container. And a container looks like this. It has a top prism and it has a bottom prism. Okay? And I've labeled it the following so that you know the language and we're going to be consistent about that language, okay? Now, the top prism is a rectangular prism, and liquid flows out of it and into the bottom prism, but the whole thing together is connected and is a whole container. Can everyone visualize it? Yeah? Okay. If you can't, this is a model of what it looks like. Okay?

Of course this isn't a prism -- looks more like a cylinder, kind of, and it's made out of soda bottles. Okay? But it's the same idea. This is the whole container -- this is the bottom prism and this right here is the top prism. Well, if I look at this prism there are 1, 2, 3, 4, 5, 6 units of height of liquid in this prism. Okay? 1, 2, 3, 4, 5, 6 units of height in this prism. If I flip this over...can I have a volunteer tell me what's happening to the height of the liquid from the top prism as it moves down into the bottom? What's happening to the height? Colin?

STUDENT: It decreases.

ANTOINETTE VILLARIN: It decreases. What do you mean by that?

STUDENT: Like when you flip it, it goes to the other bottle.

ANTOINETTE VILLARIN: It goes to the other bottle. So if I imagine this, there's liquid coming from the top prism -- it's decreasing and it's moving down into the bottom. Okay? But how many units are in here all together, if I look at units of height?

STUDENTS: Six.

ANTOINETTE VILLARIN: Six. Okay, so there's six in here. Can everyone visualize that? Okay, now I have a slight leak so I better turn it over so it doesn't leak. I have a hole on the top and while that's draining...I'll leave it like that...I want you to look up here. And it's just water and, um, food coloring. Okay? So if you're wondering what that's made of, it's just water. So up here if I look at this slide, which I just photocopied and put up here. If I put six up here at the top, can I have a volunteer tell me how many...how much liquid of height we have in the bottom, if I have six? Andrew?

STUDENT: Zero.

ANTOINETTE VILLARIN: You have zero. Tell me why there's zero.

STUDENT: Because all of the liquids are on top.

ANTOINETTE VILLARIN: Because all of the liquid is on top. Okay, so six is always going to be on top. Okay? What happens if I have four? Let's say I have four on top. Can I have a volunteer tell me what amount of liquid I'll have in the bottom prism? Justine?

STUDENT: Two.

ANTOINETTE VILLARIN: You'll have two. Justine, can you tell everybody why?

STUDENT: Since there’s only four and there's six in all, there's two at the bottom.

ANTOINETTE VILLARIN: So since we have a constraint of six, and there's four on the top, there's two on the bottom. Okay? All right, how about here? What if I have three on the bottom? Can I have a different volunteer tell me what the bottom is going to be...or the... If I have three centimeters of height in the top, what will the bottom be? Kaymyn?

STUDENT: Three.

ANTOINETTE VILLARIN: I'd also have three.