MOLLY MCNINCH: So you guys are going to -- This is your task. You guys are going to create a poster showing your thought process, data, and solution. Now, you guys are working in small groups. I'm probably going to take one person and move them with Max and Nathan because you guys are a group too. So you'll be working in small groups, which means you should be talking. We like talking. It's good. Use your time wisely. You're going to have a fair chunk of time, but use your time wisely. Now, you guys got a new piece of paper that looks exactly like your pink paper. You are recording your thoughts for today on that white piece of paper.

And in addition to that, on your poster, what I want to see is I want to see you guys taking turns to explain your thinking. Even if you didn't come to a solution, your ideas are still valid and just as important as everyone else's, so make sure that you guys are sharing your ideas. Number two is you're going to agree on a strategy for producing a joint solution that's better than your individual responses, so if Cailin had the best response out of everyone in the group, you have to create a response that's better than Cailin's because four minds are better than one.

So work together implementing your strategy, and then think carefully about any additional data you want to collect. So this goes back to that modeling of our -- do you need diagrams? Do you need tables? Do you need charts? What do you need to help you find a solution? All right, so, questions, comments, concerns? The person wearing the most black at your table is going to pick up one red cup, it has two smaller cups, and one cardboard tube. And Rebecca, I'm actually going to --

STUDENT: The greater the slant length per difference in the diameters equals a larger roll radius?

STUDENT: Okay, so I kind of just tried and solve the whole thing, but basically I found that if you multiply the slant times the wide diameter, you get two times the roll radius, and I tried that three times, and it worked for three. The E, Cup E, it didn't work, and I wasn't sure why, but the other three worked. So I wasn't sure ... She did say to think about if the slight hand -- slight -- slant height was adjusted, so I don't know if that would change the equation.

STUDENT: Okay. So, you multiplied which ... What by what?

STUDENT: The slant length times the wide diameter, and you'd get two times the roll radius. So I don't know how to factor in the narrow diameter.

STUDENT: So two times the roll radius?

STUDENT: Yeah.

STUDENT: But then you'd need to know the roll radius before.

STUDENT: Yeah.

MOLLY MCNINCH: So that's what you're trying to find.

STUDENT: Ten point --

STUDENT: It's point nine nine.

STUDENT: Yeah. Or -- yeah.

STUDENT: Okay, and then for --

STUDENT: That's for wide right?

STUDENT: Yeah, for wide. And then for the wide for B, it would be ... 9.42.

STUDENT: Exactly?

STUDENT: 9.424, something like that.

STUDENT: Okay. Okay.

STUDENT: For C, the wide diameter ...

STUDENT: Okay, so note the similarities within groups and ...

STUDENT: Yeah, so compare them. So for A, the wide diameter is three and a half, and so is, like, for F. And then they both have the same slant length. But A has a narrow diameter of three, and then F has two. And A has a much larger roll radius, so maybe that affects how it works.

STUDENT: And if --

STUDENT: Wait, so the narrow diameter ...

MOLLY MCNINCH: Yeah, so when you're thinking about the circumference, what I would recommend you doing is instead of calculating the circumference for all of them, see when the values change and how that affects the roll radius. So see, okay, if I kept this one as it is the whole time, what could happen? Or if the wide diameter got really wide or if the narrow diameter got really small or really wide. Okay? Because the circumference -- if you calculate the circumference, it might just be a lot of extra work.

STUDENT: Something like that. Do you think we could use that to make our equation, like the area of the cup?

STUDENT: Like the area or the volume?

STUDENT: The volume, like so how much water it holds.

STUDENT: Yeah, but what if this holds the same volume as like, this, but this one is less -- like, not -- it doesn't have, like, a slant?

STUDENT: Never mind. I don't know. I'm just trying to think of a formula.

STUDENT: It could be a relationship between area and volume.

STUDENT: Yeah. Yeah, that's what I was trying to say.

STUDENT: Like, not independent.

STUDENT: The wide diameter for A, F, H because they all have the same wide diameter.

STUDENT: Oh yeah, three and a half.

STUDENT: So the circumference is 10.99.

STUDENT: She said we shouldn't look at the circumference. So, okay. For H, there's no narrow diameter, and the slant length is three and three fourths, and then the roll radius is three and three fourths.

STUDENT: So H, wait, H would be a cone, right?

STUDENT: Mm-hmm [affirmative].

STUDENT: Okay. Okay, and --

STUDENT: Yes, I think yours is -- like, yours definitely has a pattern, but I don't think it's correct. There's still a lot of outliers. Want to just calculate the rest to see how that ...

STUDENT: Only F and G or all of them?

STUDENT: Well, F and G, these -- we already know that these two don't -- these three don't add up.

STUDENT: Okay. Are you doing F?

STUDENT: I'll do F.

STUDENT: Okay.

MOLLY MCNINCH: … or do you have diagrams that you want to include? Do you have calculations you want to include? Reasoning? Have you hit a wall?

STUDENT: Yeah.

MOLLY MCNINCH: Okay, so -- have you thought about what would happen when you're comparing -- so look at all these given values and see the ones that look super different. So zero doesn't fit, right? Because zero's the one where -- okay, my narrow diameter's zero, what does that mean? Okay, my slant length -- this one has the longest slant length. How does that relate? Okay? And then start looking at the differences between the wide and narrow diameter. Now, you guys kind of got to the conclusion, or at least most of you did, that the slant length correlates to the roll radius, but how do the wide and narrow diameter relate to each other and to the roll radius? Right? You can do this.

STUDENT: Yeah, whenever you include, like, both, it's bigger.

STUDENT: So put, in return --

STUDENT: Roll radius --

STUDENT: A slight difference --

STUDENT: -- over 1.25 --

STUDENT: -- between the top and bottom diameter --

STUDENT: Five point, wait – five and three fourths. 5.75.

STUDENT: -- creates a larger roll radius.

STUDENT: -- multiplied by R.

STUDENT: Yeah, that makes sense. Then you want to leave space for diagrams too. Okay. So I'm just going to box this off, so I can put the equation here. We don't have plenty of space there.