TRANSCRIPTS

ALYSSA: Crate Problem

Part 1: *We tune in after 4 minutes of working on the problem*.
AH: So, maybe you could try drawing something else, like what does a package look like?
A: I don't know. In real life?
AH: In real life--you're thinking. So in this problem it says there's four cans of juice in a package. So can you draw something that would show that?
A: [pause] I don't know, circles I guess.
AH: Sure, yeah. Something easy to draw--we don't want to make it too hard right?
[Alyssa draws a circle.]
A: You do 4 cans. [She draws 4 squares inside the circle.]
AH: Okay.
A: So you have to do eight of those. [Alyssa draws 8 circles with 4 tallies in each.]

Part 2:
AH: So you got your eight circles there. Yeah.
A: But then, four cans and eight packages. But there's six boxes.
AH: Okay. great. So how do boxes come into play?
[20-s pause]
A: Well I think it would be like groups, for like a box. But I'm thinking [inaudible]. There's 6 and if you did that it would be like 3, 3, and there's not enough.
AH: Okay, wait, tell me that--tell me that idea again. So you're saying--
A: Like, I would think you can put them in groups for one box, but that wouldn't work because if you put three in one box, there wouldn't be enough for like six boxes.
AH: Oh I see what you're saying, yeah. Okay. It does say there are eight packages in a box. So does that help at all?
A: So I'll draw eight more of these until I got to six boxes technically.
AH: So I don't want you to have to draw every single little can because that's a lot. So why don't you tell me that idea again, so you would draw more of these? Is that what you're saying? I think you said—
A: Yeah, like you would draw like eight more but six over here. So that's one box.
AH: Okay. So that's one box.
A: So then draw that many, like five more boxes.
AH: Oh five more boxes, all right. [Alyssa draws five more sets of 8 circles with 4 tallies in each.]

Part 3:
AH: Okay. I see. So—
A: I don't feel like that's right.
AH: You don't feel like that's right? Well, tell me what your picture shows, and then you can tell me why you don't think it's right.
A: The package is the circle. And then the cans are the lines.
AH: The lines? Okay. And then do you see a box in your picture?
A: No.
AH: No?
A: But there is like, that equals the box [pointing to the group of 8 circles].
AH: That meaning, eight of these [pointing to 8 of the circles]?

A: Yeah.
AH: And then do you see a crate in your picture?
A: Oh yeah. Wait, a crate, wouldn't that be just one crate?
AH: Okay. So where do you see a crate?
A: [pause] I didn't draw a crate.
AH: You didn't draw a crate?
A: No.
AH: Okay. Do you think you can see a crate in what you have drawn, or you think you'll have to do something else? Different picture.
A: I mean, since a crate would be one, maybe... [28-s pause] Wait, if a crate is just one, wouldn't it just be the same thing, but just one of them?
AH: Just one, like just this [pointing to a circle]?
A: Yeah.
AH: Just one of those? Okay.
A: But I don't--since there's six boxes. One crate would only be four, wouldn't it?
AH: One crate would be like four of these [circles]? One, two, three, four [counting 4 circles].
A: No, just one set of four.
AH: One set of four. Show me what you mean by what one set of four, so I just make sure [I understand].
A: Just one set of those.
AH: Oh, just one set of four, like that.
A: Yeah.
AH: Oh, okay. I see. Yeah, that's really good thinking Alyssa. You did a nice job on that; again, it's a hard problem.

JOANNA: Partially Filled Crate Problem

Part 1:

J: So I did two boxes with 32 cans, and I knew that from this picture [her first picture]. So I drew that. And then I knew that there were 3 packages instead of 8 packages--instead of 6 packages. [brief pause] Okay, well I knew there were 3 packages, and so I drew the 3 packages. And I knew that was like half of how many packages there should be. And so I did 32 x 3 because that's how many cans we have now. I got 96. And then I did total number of cans that I got last time [192] minus the number of cans that I have, and I got 96 more cans.
AH: Yeah, I see just how you did that. Now it looks like you subtracted off this amount right here [pointing to the three 32s in the crate]. And these are packages? Is that right?
J: Yeah.
AH: Okay.
J: Wait no. [pause] Yeah. Yeah, I think.
AH: Okay, but there's also 32 cans in a box [pointing to the picture of the box]; is that correct?
J: [pause] Um, yeah.
AH: Okay. So are a box and a package the same? Or are they different?
J: They're the same.
AH: The same. Okay.
J: Well, like kind of. In a box there's 8 cans, or 8 sections of 4, versus 6 sections of 32.
AH: Yes, I definitely see that. You showed that really nicely right here [pointing to her first picture]. In a box there are 8 sections of 4. So what is one section?
J: Four cans.

AH: Right. And is that one section--like here, you have--I think you said that's one section [pointing at her drawing of a package], with the 4 cans?
J: Mm-hmm [yes].
AH: And you labeled that package.
J: Mm-hmm [yes].
AH: So, is this a package right here [pointing at one of the sections in the box], or is this a package right here [pointing at one of the sections in the crate]?
J: This is a package right here [pointing to one of the sections in the box].
AH: Okay. So now here [new problem], the person's packed up 2 boxes and 3 packages. So would that mean--you have your two boxes [pointing at her lower drawing of the two boxes] and then your three packages [pointing at her lower drawing of the three 32s in the crate]. Are those--it looks like those are all the same size--they all are 32?
J: So, this one [box] would be 8 sections of 4; I just didn't draw it that way. I just drew it as 32 total.
AH: Yeah, that's fine.
J: Instead of dividing them into 8 sections.
AH: Right. And then you were going to subtract off the amount she's already put in--is that what your idea was?
J: Yeah.
AH: So has she already put in the 2 boxes and these 3, or just these 3 or what would you say?
J: Just... [pause] Just these three [pointing to the three 32s in the crate].
AH: Okay.
J: I think. Because the question is, how many more cans--wait.
AH: I don't ask the easy questions Jenna. Just take your time and think about it.
J: I think she has added these [the 2 boxes] in here [the crate]. So that would mean that there was 5 packages. And then 32 times 5.

Part 2:
J: Okay, so there's 8 sections in, or 8 packages in a box that each have 4 in them. And then once you do 4 x 8, it equals 32. [AH: I see.] So there's 32 cans in a whole box.
AH: Now are there packages in this crate [pointing to the top picture]?
J: Yes.
AH: How many packages are there in that crate?
J: Um [laughs]. There is [pause]. Two... [pause] In this one [top picture] or this one [bottom picture]?
AH: Either one. Are there packages in a crate?
J: Yeah, there are.
AH: Okay. How many packages are there in a crate--do you think you could figure that out?
J: Uh. It would be 40.
AH: How did you get that?
J: I did, so I know there's 8 packages in one box, and I just did 8 times 5 for this one [lower picture].
AH: I see. Since that's what you think has been packed up so far?
J: Yeah. [She draws two more sections of 32 in the lower crate.]
AH: I see. And what about in the whole crate?
J: Uh [pause] There'd be 48 because there's 6, and 6 times 8.
AH: Yes, I get that, definitely. Now here [lower crate] you're saying basically five 32s is what we have to subtract from the 192 to figure out how many more cans?
J: Yes.
AH: Okay. And that would be the result of having put in 2 boxes and 3 packages so far--is that right?
J: Yes.
AH: Okay, I get that. Really nice thinking Joanna.
J: Thank you.

ISABEL: Crate and Partially Filled Crate Problem

Part 1

AH: How would the crate look?
I: Well, if you kind of have a sort of x-ray of it, it would be the crate. [I draws.] Then inside of the crate there are 6 boxes, so, um. 6 boxes and in each box is 8 packages, so then it would just be, um... Yeah. That's 8. And then there'd be 4 cans of juice, so, how do I do this? Um. 1, 2, 3...
AH: I see.
I: Usually it would be better if I used different colors to kind of separate things, but.

Part 2:

I: Well, we have 116 cans and you need to figure out I thought I'd just start small, and I needed to figure out how many times it would fit into a package. So I divided. And there's 4 cans in a package, so I divided 116 cans by 4. And I got 29. So that would be 29 packs. And then I needed to figure out how many of that would go into a box. How many times that would go into a box, I mean. And so there are 8 packages in a box, so I divided 29, um, 29 packages by 8 and I got 3 remainder 5.
AH: Yeah. And the 3 means, then…
I: It fits into 3 boxes.
AH: And what's the remainder 5 mean?
I: Well, that there's, you have to, you have extra stuff and we need to put it in something else.
AH: So are those 5—does that 5 refer to cans or packages?
I: It's 5 cans.
AH: Okay. I see. Now the 29, what's that refer to again?
I: That refers to the amount of packages.
AH: Okay. So when you have 29 packages you're saying you can put 8 in a box and another 8 in a box and another 8 in a box. And then what?
I: And then you have 5 more, so you either have a bit of a package and a bit of a package, or you just put the rest in another box.
AH: Okay. But, if you were saying that these were 29 packages, I'm just wondering a little bit about the 5 and how it's cans.
I: Oh… Oh, so it's 5 packages.
AH: Would that make sense, for it to be packages?
I: Yeah.
AH: Okay, how come?
JI; Because I'm dividing the packages up and not the cans.
AH: Okay. So now, so then how would you interpret your answer here?
I: Well, you'd need 3 boxes and 5 packages. You could put those into the box and have extra space.
AH: Okay.
I: Into another box and have extra space. Or you could just have the 5 packages.
AH: Uh-huh. I get you. Now, the person has already packed up 2 boxes and 3 packages. So does your answer here make sense with that information?
I: Yeah.
AH: How come?
I: Well, so 2 plus 3… 2 full boxes and 3 boxes that would be 5. And then, um, you have 3 packages and 5 packages, and those add up to 8 packages. There's 8 packages in a box, so you'd have another box and that would be 6. 5 plus 1 is 6.
AH: Nice. Really nice work. All right, Isabel, that was really nice thinking.

WHITNEY: Crate Problem

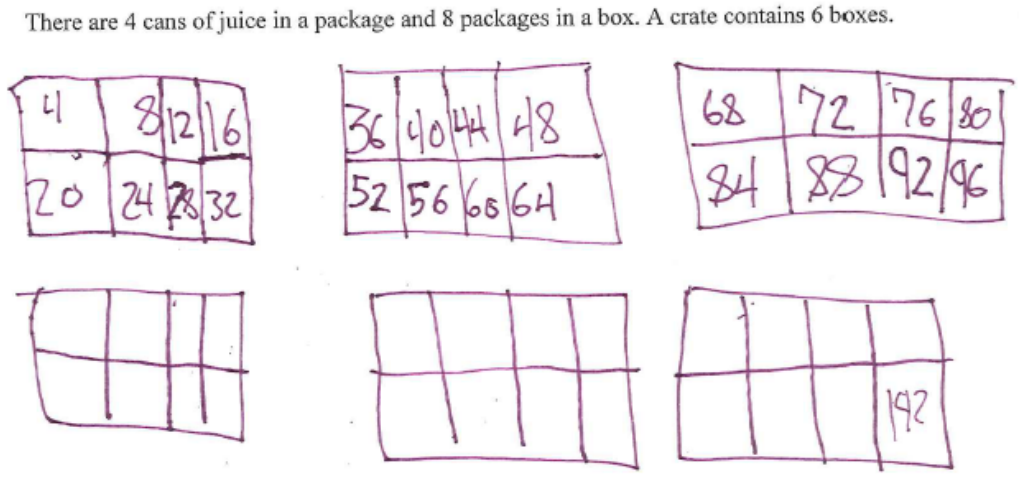
W: So, 4 cans. So. I'm going to draw about 6 boxes. 1, 2, 3, 4, 5, 6 [draws 6 rectangles]. Okay, so 6 boxes. Now there are 4 cans in a package. And there are 8 packages. So. The boxes. [She draws square regions and writes numerals as she speaks.] 4, 8, 12, 16. Okay, so, 16, 20, 24, 28, 32. So 32 in this box. Wait, so, in all, right?

AH: Find out, in the whole crate, we want to know how many cans and how you can show that with a picture.

W: All right, so, [softly] 32. [softly] That's 8. [She continues to the second rectangle.] 36, 40, 44, 48, 52. Yeah, 52. 56, 60, 64. So 64 in 2 crates.

AH: I see what you're doing; it's pretty neat.

W: Okay, so, 68, 72. Wait. So, 6 plus 4. [pause] 72, 76, 80. I'm just going to draw a bunch of boxes. [She is going to draw the square regions inside each rectangle.] 84, 88, 92, 96.



AH: So, you could just keep going and we'll get to the answer eventually?

W: Yeah.

AH: You're doing a great job of going up by 4's. That's really cool. I wonder, is there any other way to figure it out, besides continuing to go by 4's all the way up?

W: Well, you can multiply it.

AH: Okay, what would you multiply?

W: 4 times… 6 boxes of 4… Or you could div--no… You could multiply it but I don't know what to multiply it by, because you've got to get to this [last square region] first to know what to multiply it by.

AH: You've got to get to this first to know what to multiply it by, is that what you're saying?

W: You've got to get to the end [points to last box].

AH: You've got to get to the end. I see.

W: Then you can divide it and see what 4 times it is like, what you can multiply by.

AH: I see what you're saying. 4 times something is whatever this will be at the end [pointing to the last square region]?

W: Yeah.

AH: And you're not sure what that would be?

W: Yeah.

AH: I get that. So, you figured this [first box] out by doing 4, 8, 12, 16, 20, 24, 28, 32. It was super [what you did] to figure out what that would be. What does the 32 mean in the problem? Does it mean cans, or packages, or boxes, or what?

W: It means how many, like how many cans is in a box.
AH: Okay, great. So, is there any way you could use that 32 to figure out how many cans would be in the whole—in all of them?
W: I could multiply it by 4?
AH: By 4? Okay. So why would you multiply it by 4?
W: Because. Hey! So, if you did all of this the same [gesturing over the boxes], it will all be 32. So you could multiply 32 by 4 to see what the original answer is. Without having to add it all.
AH: Okay, 32 times 4—where would you see the 32 times 4 in your picture?
W: All right, so, like, you can put it, 32 times 4 here [pointing to last square region].
AH: It'd be the answer there, at the end? How many 32's do you think you have in your picture there?
W: Six 32's.
AH: Okay, so would you do 32 times 4 or 32 times 6, or what would you say?
W: 32 times, wait, so in all, 32 times 6.
AH: Oh, okay. Okay. And how does that relate to up here?
W: Because there are 6 boxes and it has 8 packages in a box and there are 4 cans in that package. So it would be like 6 times 32 because the, because however many it is, it would be like. I can't really explain it.
AH: [laughs] No, you're doing great.
W: Okay, so like it would be like. Okay so it would be how many it is in all. Because there's 6 boxes with 4 cans in, of box, of juice in each, and then 8 packages in a box. So it would tell you the, it would determine the answer of every, of all. Like how many cans is in a box.
AH: Yeah, I see what you're saying. Well, let's do it. 32 times 6 and see what we get, and see if that makes sense.
[W computes with her standard algorithm.]
W: 18, plus one of these is 19, so 192.
AH: Okay. So 192. Now where would that show up again?
W: Right here [pointing to the square region at the end; she writes "192"].
AH: Okay. Right there, if you kept going. I see. So, you said 32 represents the cans--number of cans in a box, right?
W: Yes.
AH: Yeah. Um, and you were also saying something about how you could, you'd have to figure out how many 4's to go by to get all the way up here. Is there any way you could figure out how many 4's you would have to count by to get all the way up there?
W: I can try to divide it.
AH: Oh, you would try to divide the 192?
W: Yeah.
AH: What would you divide it by?
W and AH: 4.
AH: I see. You could do that. Is there any way to tell it in another way? From the picture or from--
W: You could probably count by 2's.
AH: Count like, how would you do it?
W: 2, 4, 6, 8 [pointing to two square regions, or packages, at a time].
AH: I see what you're saying. And keep going like that and figure out how many that was? Really nice. Really nice work, Whitney, that's super.