Dog Problem – Grade 6/7 Solutions
https://youtu.be/IAuNB8nWOQg

Student A: We got, like that was the diagram to draw the squid and then we drew it first from the head to the body and we used a metre stick for the measurements.

Student B: So you mark which part of this, we put a line to mark which part of the squid it started and when it finished.

Teacher A: So now that I've got you thinking proportionally, this is today's problem.

Student C: If one dog grows from five kilograms to eight kilograms and another dog grows from three kilograms to six kilograms, which dog grew more?

Narrator: This problem is one the students will solve during the upcoming lesson. It is recommended that educators pause here to solve it for themselves. Actively working through a problem and solving it in more than one way in advance of the lesson helps teachers to begin to decompress their own mathematical knowledge and understandings. It also assists educators to better understand and assess student work.

Teacher A: Okay, what information do we have that's going to help us to solve the problem?

Student D: We have the two dogs that grew from five to eight kilograms and we have the other dog that grew from three to six kilograms.

Teacher A: We want you to show your solution in two ways, to prove which dog grew more.

Narrator: As students collaborate, consider the classroom conditions that have been cultivated by the teachers. Note the interactive strategies students use.

Teacher A: Get started.

Student A: I think they both grew the same because they both grew three kilograms, it's just that the three to six dog kilogram is just smaller. Because five plus eight, I mean three plus five is eight and then to double three is six, so they both grew the same because they both grew three kilograms. Just the three to six dog is smaller.

Student E: It's saying growing more, not, it's talking about growing in size and smaller is a different size so it's not the same.

Student A: It kind of is because if they're both growing three kilograms, it's kind of the same.

Student F: It started off with three and then it grew to six.

Student G: No, it can't be

Student H: What do you think is the response? Because look, eight kilograms right and the other one is the other one right?

Student G: The other one is six kilograms. Yeah. Yeah, but when they started out

Student H: When you count from one do you count six first or do you count eight first?

Student G: You count six first.

Student H: Exactly.

Student G: But but, the first one started off smaller so it's going to end up smaller.

Student F: Yes.

Student G: So it, the first one started off as three, it grew three kilograms, just like the other dog to get the sickness. But then the other dog started off bigger, so it started off at five kilograms and it grew three kilograms to eight. So they both grew at the same rate, just the one dog started off being bigger than the other dog. So that's why both of them are the same, and then, and then it grew. Yeah, but. Peter help me out here.

Student I: They both grew the same amount, they both grew the same amount but the first one that grew from five to eight was originally bigger than the first, the second one.

Student F: Yes, it grew from three to six.

Student I;   But they both grew the same amount, but the question is asking which one grew more not which one is bigger now?

Student G: Yeah exactly. Which one grew more over the period of time?

Teacher A: Are you saying it's the same?

Student F: Yes, it's the same.

Teacher A: Okay. Does, where it starts or where it ends up have any influence?

Student G: Well, yeah, because Lucas made the point that the first dog ended up at eight and the second dog ended up at six, so if you didn't know what they started off at, because if they only gave us the ending number, we could think that this started off at three and this started off at three so then we could have said that this dog grew more, but they started off at different numbers.

Teacher A: Okay, so but, the end point doesn't really matter in this case?

Student G: No, I guess not.

Teacher A: Because you are saying it's the same, so, okay. How much did the weight of the second dog change?

Student G: The weight of the second dog changed three kilograms.

Teacher A: How about, how much did the weight of the second dog change with respect to its start weight?

Student G: Three kilograms, because it grew three kilograms, oh it doubled!

Teacher A: It doubled its start weight. Is that okay with everybody?

Student G: Yeah.

Teacher A: Does that make sense?

Student G: Yeah.

Teacher A: What about the first dog?

Student G: The first dog didn't double.

Teacher A: So more or less than double?

Student F and G: Less.

Teacher A: Okay.

Student F: Because if it doubled, then it would be ten.

Teacher A: Okay

Student F: So this, wait.

Student G: Wait, hold up, hold up. No but the thing is though, both of them grew three kilograms, so does it mean like how much did it grow in respect to its starting weight or just how much did it grow? Because we thought oh, they both grew three kilograms, so they ended up at different numbers, but yet he's the only one that didn't think that.

Student H: I was alone.

Student G: And then, so.

Teacher A: So now, now you're thinking Lucas is the one on the right track.

Student G: Yeah, but if that one doubled but this one didn't double but this one started off at a bigger weight, so this one's start weight was almost this one's end weight. So, it…as when you're bigger you don't grow as much as when you're smaller.

Teacher A: Okay, so the way you're looking at me, do you actually have two answers?

Student G: Well, umm.

Teacher A: Like this one you're saying it's the same, if using Lucas' strategy, is there one that actually grew more?

Student G: But Lucas, when you said this one grew more, did you mean in respect to its start weight? Like doubled? Or did you just say oh that first one

Student H: End weight.

Teacher A: Okay, so you used end weight. So there's another way of looking at it by end weight, and the other way of looking at it as one doubled and one less than doubled.

Student G: Wait, wait, wait, hold up. So, just to put in perspective, I'm going to use the people in this group right now. I'm the tallest, and then you. So say you started off at like, I don't know 5'6, or something and I started off at like 5'8, if we both grow one inch,

Student H: I'd be 5'7

Student G: 5'7, fine. And if we both grow one inch, I'd grow from 5'8 to 5'9 and you'd grow from 5'7 to 5'8.

Student H: That means you're bigger, or taller.

Student G: Yeah, but we both grew at the same, the same amount.

Student H: Yeah, but you'll always be bigger.

Student G: Yeah, I'll always be bigger, that's because I was born bigger, so well, our rate is going to be the same.

Teacher A: Okay, so I'm going to let you guys struggle with that a little more.

Student G: Oh great.

Teacher A: If you feel the need to come up with, say, if you look at it this way, it's this answer, if you look at it this way, it's this answer, if you want to do that that's fine in your solution. That's what I'm looking for, multiple solutions, remember? Yeah, Okay?

Teacher B: I just spoke with this group and I'm getting them to write out their thinking and show me what they've actually done because one of the students actually said that they did five plus three equals eight and used the word doubled to describe the other word, so they're making that connection. So, rather than saying that three plus three was six, he said this dog doubled in weight.

Teacher A: So we're getting into multiplicative.

Teacher B: Mhmm, mhmm

Teacher A: And two of the other groups over there, with a little prompting from me, they used that too, but they're still struggling to try to think about is that the more meaningful way to look at it. So I encouraged them that if they wanted to actually give two solutions, two different solutions, rather than two representations of the same solution, that's okay.

Teacher B: Okay.

Teacher A: And, the group over there, they've got, they represented it two ways but they're clearly at an end. Even though I probed, nothing.

Teacher B: Yes, some groups are still there, but I'm happy to see that this group has made that connection.

Teacher A: Yeah, and this is the group that had originally really struggled,

Teacher B: Right!

Teacher A: So that is really nice to see.

Teacher B: Yeah, and my students are in that group so that's nice to see.