**Myles Non-linear Equations**

Myles:Here’s our two equations, and now what you’re asked on C and D on Number 8 is to tell whether the graphs of these two equations are going to intersect. Yeah, we could make the graphs; yeah, we could punch ‘em in the graphing calculator; we could see if they intersect. But just looking at the equations, and looking what you know about initial value, growth factor; all that kind of stuff. Would it appear that these two graphs will intersect?

Students: Yeah. Yes.

Myles: Give me a reason why. All right, Jade.

Jade: Okay, on the first one, the y equals 50, the y intercept would be 50 and that would be lower than the y intercept on the other one which would be 350, but the y intercept at 350 – I mean the growth factor, is slower.

Myles: For which one?

Student: For the second one; it’s slower than the first one, so the first one would catch up and to the second one, I guess.

Student: Wait, wait. They would only intersect if they had the same growth factor.

Student: Yeah.

Myles: But since this growth factor is faster? All right, so let me graph this. So let’s say the first graph is going to look like something like that.

Student: Yeah. And the second graph is gonna go [sound].

Myles: Like what? It’s not going to grow as quickly?

Student: Okay.

Myles: Okay. So, yeah. So they’ve got to intersect somewhere, right?

Student: Yeah, but if they had the same growth factor… wait. Maybe intercept.

Student: No, if they had the same growth factor, then they’d be the same slope.

Student: That’s true.

Myles: Yes, we’ve got to be careful using the word ‘slope’ because we use slope to represent linear relationships. Now what’s the slope of a curve – that’s something we’ll get into in calculus, right?

 So there has to be a point. Now, Emma, you estimated that it’s between our x is 1 and x is 2?

Emma: No.

Myles: No?

Student: No, well I had it, but I don’t...

Myles: You don’t think so? I just drew this, I mean, don’t – I’m just drawing this. All this graph says is the y intercept, and this is a slower growth; this one here is a slower growth than the, the 2.2. That’s all it says. What’s that?

Student: I think I got a good estimate.

Myles: All right.

Student: It’s 4 and then…

Myles: What’s 4?

Student: The x.

Myles: You’re going to say x is 4?

Student: Yeah. ‘Cause in year 4 is when they first …collide, I guess.

Myles: According to the tables?

Student: Yes.

Myles: Okay.

Student: Yeah. According to the tables. And then, I think at around, um, ten, er ten, er sorry. One thousand elevenish.

Myles: What do you have Year 4 for the…[taps board]

Student: First equation?

Myles: For the second equation? What do you have for Year 4 on that one?

Student: Oh, 2009.3.

Myles: And then Year 4 on the first one?

Student: 1171.

Myles: Right. So those are pretty different, right.

Student: Wait. I was looking at 3 as 4.

Myles: Oh, I see what you’re saying. Okay. You were looking at 3, Year 3 in the second table, and Year 4 on the first. Okay. So, I don’t know. Year 5? Are they going to intersect in the first 5 years?

Student: Yeah.

Myles: Well, let’s see. In the first table . . .

Student: No, they’re not, because all of the first table – wait, yes they are. Because the 5th year is higher than the 5th year on table 2. So therefore they are going to intersect in 4 to 5 years.

Myles: What is your 5th year in table 1?

Student: My 5th year?

Myles: Yes, what’s your y value in your 5th year for table 1?

Student: 49,000. For table 1? 58,000.

Myles: For this graph, this equation right here? 58,000? All right, let’s slow it down. All right, I’ve got to erase my beautiful snub drawing here. All right, let’s see what we’ve got. So let’s see. All right, what have we got? Let’s just hash it all out here. So Year 0, we have 50 and 350.

Students: Yeah.

Myles: Okay. Year 1?

Student: 110 and 595.

Myles: Okay. Year 2? 242.

Student: And 1011.

Myles: Okay 10-11. Year 3?

Student: 1171.

Myles: For Year 3?

Student: Sorry. 532.

Myles: 532. We have 17-19 here?

Student: Yeah.

Myles: Okay.

Student: Year 4 – 11-71.

Myles: Year 4 – 11-71 for the first equation?

Student: Yes.

Myles: And then what do you have for the second one?

Student: 29-23.

Myles: 11-71; 29-23. And then you have 25-76 here?

Student: Yeah.

Myles: [Writes 4969 on board for year 5 for second equation.]

Student: So according to that [inaudible].

Student: I’m way off.

Myles: So are they going to intersect in the first 5 years?

Student: No.

Myles: Right? Tell me why?

Student: Because they don’t ever … they just don’t. The numbers…

Student: ‘Cause the bottom equation… yeah.

Myles: Right. Okay. These values are all – the dependent variable values on the bottom equation are all bigger than this one here. Are they catching up?

Student: Yeah.

Student: Well, let’s see. It’s like, it’s like the first one is like a seventh of it.

Myles: Right.

Student: And in the second year, it’s close to like a fifth of it.

Myles: Right.

Student: And then it’s close to, like a little bit less than a fifth. So yeah, it is going to catch up eventually.

Myles: Yeah. And if this were 100 and this were 600, this would be a sixth.

Student: Yes.

Myles: So it does like they’re coming closer; they’re getting closer, okay?

Student: I think it’s going to be Year 6.

Myles: Year 6?

Students: No.

Student: I thought that you mean…

Students: No.

Student: Probably between 8 and 12.

Myles: Between 8 and 12?

Student: Well, that’s a half.

Student: That’s a big…

Student: Yeah, that’s about a half.

Emma: That’s about a half, so it’s probably going to be up around year 10, isn’t it?

Myles: So it’s going to what?

Student: Be after year 10.

Emma: No, but it’s growing by 1/10th per year, 1/10th of the thing… well, yeah, it’s like 1/5th, then 1/6th, then 1/7th, and now they’re at 5…

Student: What is she saying?

Emma: Never mind.

Students: [all talking at once]

Myles: Well, Emma, are you saying, Emma, it’s like this is like a seventh here; one sixth here; is that what you’re saying?

Emma: Yeah.