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Transcript for October 24 - 27, 2007

‘‘Teacher Questions: Examples of Classroom Interchanges’’

The class is working on *Growing, Growing, Growing*, Investigation 4

•‘‘Teacher Questions: Examples of Classroom Interchanges’’

Class: 8th grade
Date: October 24 - 27

Chapter 1: Introduction
Time: Approximately 00:00 - 00:00:40(times from start of video)

Title Slide

Slide
The class shown here is working on
Growing, Growing, Growing, Investigation 4

Slide
Kathy Dole tailors her questions to different situations: small group or large group, exploration or summary.

The clips shown here form a selection of the questioning techniques she uses. She makes this look effortless and natural; we can only infer the planning and practice behind the scenes.

Chapter 2: Small Group Finds an Equation
Time: Approximately 00:00:41 - 00:01:15(times from start of video)

Slide:
Problem 4.1 in text.

Line 1, 00:50

Sarah: Divided by -

Mike: .0625 - so that's it right there.
Sarah: Didn't work.

T: How do you know that didn't work?

Sarah: 'Cause it goes from 1 to - wait - maybe it did work.

Mike: Yeah.

T: What'd you do? I didn't see your equation.

Line 10, 00:58

Sarah: Y = 64 divided by 2 to the X.

T: And why does that make sense to you? You started with 64, I heard you say.

Sarah: And then you're dividing each of them by 2.

Mike: 'Cause that's the starting point.

Sarah: Yeah. 64's the starting point and then you divide them by 2 to the X.

Mike: Yeah, that works.

Chapter 3: Discussion of the Equivalence of Three Equations
Time: Approximately 00:01:17- 00:05:18(times from start of video)

Line 1, 01:17

T: I think we need to decide about these equations. Let's put all of them in our calculator so that everybody has them to look at.

Student: The third one won't work.

T: The third one won't work?

Student: It doesn't work for me either.

Student: They're all the same.

Line 10, 01:50

Student: Third one won't work for me either.

Student: I got the third one to work.

Student: They all work.

T: How do I decide if they all work, Megan?

Student: They're all the same.

Megan: Um, you can go to table.

T: Ooh. My table's way messed up. I gotta get back to zero. There, I'm more comfortable. Okay.

Line 20, 02:08

Megan: And then they're all the same.

T: All my tables are the same?

Student: Yeah, they are. Yeah, they are.

T: Let's see. That one starts at 64. Okay. So does this one, starts at 64. And the last one. They all do look the same. Why do they all work?

James: 'Cause they're all the same things, just written differently.

Line 30, 02:35

T: How are they all saying the same thing but written differently? Let's start with the first one. Does the fact that we started with 64 and then we divide by 2 to the X power seem reasonable?

Class: Yeah.

T: Why does that seem reasonable? Brittany.

Brittany: Because on the equation that's really what - I mean, on the table, that's what you're doing. You're, you're
Line 40, 02:57 dividing it by 2 so it goes down by 2 each time.

T: So I'm dividing by 2 every time. As I make a cut, I divide by 2, make a cut, divide by 2. So if the second equation also gets me the table, what does the second equation say to me? Sarah.

Sarah: Well, um, when you divide by 2 it's the same as multiplying by a half, because, like if you were to take 64
Line 50, 03:24 divided by 2 you'd get 32, and if you take 64 and multiply it by half you get 32.

T: So 64 times a half is 32.

Sarah: Yeah.

James: 64 divided by 2 is the same.

T: So dividing by 2 is the same as multiplying by a half.

Class: Yeah.

T: Makes me think of stretching and shrinking last year when we wanted to
Line 60, 03:43 shrink those figures when we were looking for that scale factor. When she was saying that that was what was going through my head. So those two seem reasonable. What about that last one that gave us the same table. 64 times 2 to the negative X.

Student: That's kind of --

T: That one's kind of funny - is that what somebody just said?
Student: It works.

Line 70, 04:00 T: It works? Why does it work?
T: So what does that negative X do?

Jon: Makes it go down.

T: Makes it go down?

Jon: Yeah.

T: Why?

Jon: Um, because the minus, well, yeah, a negative is going down and a positive is going up.

T: So this positive makes it go up, but
Line 80, 04:19 these were going down.

Jon: Because - they were going down because it - they're, they're dividing, and it's .5. Oh, I don't know for a second. I don't know.

T: What does -
Jon: The first one's going down because it's dividing by 2.

T: So that's what causes that one to go down.

Line 90, 04:41 Jon: Yeah.
T: It has nothing to do with the X. It's the division.

Jon: Um hmmm.

T: Heather.

Heather: Well, I know for the second one it's going down because when you multiply by a fraction it's get a smaller piece -

Jon: Yeah.

Heather: Because like the multiplication
Line 100, 04:57 sign means like half of 64, and a half of that. But for the last one, it's going down because the negative X, when you put that in there, it makes it - oh, what was I going to say? Crap. Um, you're multiplying by a negative, and when you have it it goes down because multiplying by negative - wait, no, that's the wrong thing to say.

Chapter 4: Discussion of the Graph
Time: Approximately 05:18 - 06:36(times from start of video)

Slide
Student graph of 4.1D

Line 1, 05:29 T: Then Collin brought up a second point. Besides this Y intercept and the relationship that James just talked about, what about down here? Does this one go into the negative?

James: Yeah, so -

T: When will this go into the negatives?

James: At 7 -

T: At 7 it goes into the negatives?

Line 10, 05:52 James: I think so.

S: It never goes into the negatives.

S: No, it never goes into the negatives. It just keeps getting into smaller and smaller-

T: Carson.

Carson: Um, if you always, if you cut them by half, there'll always be a part even if you can't see it.

S: Yea its never gonna go away.

Line 20, 06:04 Carson: Yeah.

James: Right, but like on, on the graph it was -

T: So your graph did go in the negatives?

James: Yeah - er - wait-

Carson: It'll always just be split by half. It'll just be a really huge decimal.

S: It would be like point zero something - always have a part of them.

Line 30, 06:19 Students, off-camera: Yeah, part of them. It'll be part of a part. Yeah. It'll always be part. Part of part.

James: Oh yea you're right, you're right, just got into decimals.

T: So you're getting smaller and smaller decimals, James?

James: Yeah.
T: But you're not going to have a negative?

Chapter 5: Discussion of the Definition of Decay Factor
Time: Approximately 06:37 -10:20 (times from start of video)

Line 1, 06:47 T: So let's put that in vocab. How can we put in vocab what Logan and Elle have just said? To help us with that, can somebody tell us how we defined growth factor? Ashley.

Ashley: It's the number you multiply by on an exponential table.

T: So you said it's the number you multiply by on an exponential table.
Line 10, 07:08 What are we going to say for decay factor? Somebody have an idea? Logan.

Logan: It could be just the same, because you can still multiply by a fraction of a number.

James: It's like the, it's like the same as decay factor, except it's -

Logan: It's the same as decay -

Students, off-camera: Same as growth factor -
Line 20, 07:25 James: It's the same as growth factor, except it's decaying.

Logan: Yeah. Only it's like, it's not, it's not a whole number, it's -

James: You're multiplying, multiplying by a decimal.

Logan: Yeah.
James: A part of it.

T: So, how can we put into words what you guys are saying to it'll make sense to us a
Line 30, 07:40 day from now?

Collin: Like, it's how much it decreases by in either multiplication or division, like how much the, like, line or graph or whatever that is, how much it will go down by, uh, and it can be either multiplication or division, alright? Does that make sense, or no?

T: You guys said "how much it decreases by," -

Line 40, 08:09 S: Right.

T: And then you said "using multiplication or division." Can you clarify that, 'cause that confuses me? Why do you have using multiplication or division?

T: So how will I know whether I'm going to be using multiplication or division if I have exponential decay? I see what Elle is saying, that in one of these equations we talked about it as division, and in one
Line 50, 08:39 of these equations we talked about it as multiplication. I just wanted a way to kind of clear it up in my vocabulary because I don't want to look at this in a couple days and go "Do I multiply or do I divide?"

James: Well, it doesn't matter as long as you can, as long as you can make'em the same, like if it - like you can divide by 2 or multiply by half,

Line 60, 08:59 Logan: 'cause it's the same thing.
T: But how can I write that in here to remind myself of that. Katie.

Katie: Um, you divide it when there's a whole number and you multiply it when there's less than 1.

T: Okay.
S: Part of a whole.

T: Could I use negative numbers?

Class: Yes. Yeah.

Line 70, 09:17 T: And would negative numbers cause the exponential decay to happen?

S: Yeah.

T: Okay, Collin, would you try a couple and see if a negative number will work.

Collin: Okay,

T: And then while he's trying that, for division you guys had said something and now I've forgot what you wanted me to write here. Jon.

Line 80, 09:32 Jon: Um, if it's a whole number and then you, then you have to divide.

T: Heather.

Heather: I tried the equation on the board, 64 one, and I put it as a negative 2 to the X, and it doesn't work, 'cause you, it goes up but it's negatively going up.

T: So you're getting more and more negatives?

Line 90, 09:53 Heather: Yes.

Collin: Yeah. I've, I've been doing it. I've been trying a whole bunch of different numbers with the negative. Every time I do it it's, uh, it's going down but it's negative down, so it's -

T: And that's not what you want.

Logan: You can't, you can't use a, you can't use a negative number, so I guess we're gonna have to put "between zero and
Line 100,10:13 1" for the fraction part.

Chapter 6: Small Group Discussion of an Equation
Time: Approximately 00:10:20 - 00:11:34 (times from start of video)

Line 1, 10:31 Zach: You're taking 20% from 60 and that's 12, so you take that away from 60 and it's 48, and then -

T: Okay. Hold on a minute. You're going to take 20% away from 60. How do you know that's 12?

Zach: Because if you move - when in the 6th grade we were taught to move the decimal over one, and that's 10%, and 10%
Line 10, 10:49 of 60 is 6, and then you just double that, so it's 12.

T: Okay. So 20% of 60 is 12 and you're taking that away -

Zach: Yeah. And then it's 48 and you have to find 20% of 48 and take that away -

T: So your table - is it going to show what you're taking away or what we're keeping?

Zach: What we're keeping.

Line 20, 11:06 T: What we're keeping. So your table, you wanted to show 60 and then the 48.

Zach: Yeah. Collin, Collin has the table at his desk.
Alyssa: I don't understand that equation.

Zach: I don't understand the equation but I, but it makes, the graph, the table makes sense.

Alyssa: Where'd you get .8?

Collin: First I did .2 and that looked,
Line 30, 11:23 like retarded so-

Alyssa: Yeah, but you're taking away 20%.

Megan: Yeah.

Zach: But you're leaving 80%. That's how we got it.

Collin: Yeah, we're -
Zach: We're leaving 80% - that's what it's showing.

Collin: Yeah -

Line 40, 11:33	T: So the equation is showing what you're leaving?
	Collin and Zach: Yeah.

Chapter 7: Heather Finds a Different Equation
Time: Approximately 00:11:34 - 00:11:45 (times from start of video)

Line 1, 11:39 Heather: Kind of, but we found a different equation, and it's Y equals 60 divided by 1.25 to the X. And it still works but it's just kind of different, so.

T: Why does that work?

Heather: I'm not sure.

T: How did you come up with divided by 1.25 to the X?

Line 10, 12:02 Heather: I knew that for the one it had to be 48 'cause I did the 60 times 0.2 and everything, and so then I started typing in like random numbers for - to the X power before that, and I found like 130 was too high and then 120 was too low, or 1.2, so I put 1.25 in and it got me what I needed.

T: So you used a guess and check idea to come up with this.