

This transcript is the property of the
Connected Mathematics Project,
Michigan State University.

This publication is intended for use with professional development. It is protected by copyright, and permission should be obtained from the Connected Mathematics Project prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording or likewise.

Jacqueline Stewart and Elizabeth Phillips,
Connected Mathematics Project.

Copyright © 2007 by Connected Mathematics Project, Michigan State
University

Transcript for February 13 - 18, 2007

"Developing an Algorithm for Multiplying Decimals:
*Bits and Pieces III, Computing with Decimals and Percents
Investigation 2*"

The class is seen working on Investigation 2.1,
"Relating Fraction and Decimal Multiplication"

The video was shot in real time and edited from 2 days,
Approximately 2 hours, to 29 minutes.

•*Bits & Pieces III, Investigation 2*
Class: 6th Grade•
Date: February 13 and 15

Chapter 1: Launch 2.1**Approximate time 00 - 06:12 (Times from start of video)**

Slide

*Launch**Real Time: 10 minutes*

Line 1, 00:25 T: Um, after the first Investigation, it's check-up time. So tonight, your homework tonight will be a check-up, but it's quick and it's real short. It's real short and quick, but it's an adding and subtracting check-up. But we're going to go ahead and instead of taking class time to do the check-up, we're going to go ahead and dive into the next

Line 10, 00:47 Investigation. And the next Investigation is going to help us think about multiplying with fractions. Now when I said that, Schuyler immediately said, "Well, can't you just switch them to fractions and multiply across, multiply across, and then just switch it back to a decimal."

Jesse: Too much work.

T: Too much work, you think?

Line 20, 01:12 T: Okay. I tell you what. It's almost like I paid Schuyler to say that, 'cause it's exactly what we're going to do today. And then, hey, you know what, and Jesse, maybe if it is too much work, maybe by doing that, it'll help us think about an easier way. I don't know. When we, when we did that with, with, addition, subtraction, some of you said, "Well, that's a lot of work to get it all switched over to decimals, er, to fractions. But ooh, if we just add our zero in there, that was kind of easy." So maybe there's a way that this can help us think about multiplying, but maybe we don't have to actually do that every time. I don't know. Let's see.

Line 30, 01:44 T: Okay. What we're going to do is we're going to think about situations in which we would need to multiply. When we added, you guys just seemed to have the sense about what you're were supposed to do. Like I heard you say, "Well, if it says 'altogether, ' you put them all together, and that's adding." I heard some of you say, "If the question asks you, 'How much is left,' that obviously means you took some away and you're trying to find out what's left."

Line 40, 02:09 Multiplication is a little trickier. What if I told you this? What if I told you that my husband was going to coach Caroline's soccer team, and there's fourteen kids on it. And there's a special going on right now, soccer balls are sixteen dollars and seventy-nine cents a ball, and my husband says, "I'll go buy them for all the parents and then they can just reimburse me." So he's going to buy fourteen soccer balls and they each cost this. Can you help me write a number sentence to solve that? Violet, what would the number sentence be?

Line 50, 02:40 Violet: Sixteen dollars and ninety-seven cents, no, seventy-nine -

T: Okay.

Violet: Times fourteen.

T: Okay. And why would you times it by fourteen?

Taylor: 'Cause you times it -

Student: Fourteen kids.

Violet: 'Cause there's fourteen kids.

T: Okay.

Violet: That's how many you got.

Line 60, 02:58

T: So, is it fair to say we have fourteen groups of sixteen seventy-nine?

Class: Yeah.

T: Remember when you were doing multiplication and you did all these arrays and you said four rows of six -

Class: Yeah.

Line 70, 03:17

T: Or five, you know, over and over and over you did that. Is it fair to say that I have fourteen of these over and over and over? So that would be a time that we would definitely want to multiply, right? About how much is one soccer ball?

Class: Seventeen dollars?

T: You would call that seventeen? Would that be an easy problem for you to do in your head -

Class: Yeah.

T: Seventeen times fourteen?

Class: Yeah. No.

T: Okay, what's the answer.

T: What else - what is this really close to?

T: Fifteen, maybe.

Line 80, 03:33

Class: Twenty.

Student: _____ would be under.

T: Okay. Could I call it twenty and know that that would be way too much? Isn't twenty times fourteen easy to do?

Class: Yeah.

T: How much?

Class: Two hundred and eighty.

Line 90, 03:45 T: Two eighty. You see, that's the point of estimation. Not that you spend forty-five minutes and go, "Oh, yeah, it's about." Estimation is about estimating. How can I get it to a nice easy number so I can just do it like this in my head. Okay? Alright, so. This was the actual, and this was our five-second estimate. Not too bad, right? Yeah?

Nicky: Uh, like, would you say whether you always want to estimate over it?

T: Because?

Nicky: Because you don't want to be short, money.

Line 100, 04:19 T: Alright Another situation. Um, my dog Pooh, um, is always hungry and the girls dropped something on the floor in their bedroom and Pooh was trying - it was some sort of like taffy or something - and Pooh was trying to eat it off the carpet and destroyed a whole patch of carpet trying to get the taffy - ate the carpet.

Hayden: Is that true?

Line 110, 04:42 T: It's not exactly true. It's a little bit of a stretch. He didn't destroy the carpet. He did do that, but he didn't destroy the carpet. But I'll pretend like he did for my story, okay. So play with me, Hayden. Alright. So, anyway, we've got to replace the carpet. So when I measured last night, the room is ten and five tenths feet this way and twelve and three quarters feet this way. So, how do I find out how many square feet I need of carpet? Caleb, how do I figure that out?

Caleb: You multiply ten point five by twelve point seven five.

Line 120, 05:12 T: Okay. So, how come Caleb used multiplication here? Anybody.

Class: Finding the area. Finding square feet.

T: You're finding the area, so I've got to multiply. So in life we're going to have a bazillion situations where we've got to do this. So, let's look at some situations today, and we're going to take Schuyler's suggestion and we're going to go with it today. We already know how to multiply with fractions. In fact, we discovered it's the easiest computation.

Line 130, 05:34 Student: Tell me about it.

Line 140, 06:12 T: Tell me about it. It is. The, the thing we were most scared of turned out to be the easiest. So, let's use what we know, and let's solve some problems using Schuyler's idea. And then let's come back and look at them and see if there's something else we can figure out connecting it to decimals. We're on page 23, okay? At the very top of the page you're going to see some apples, alright? You guys are going to do problems 1, 2, 3, and 4, because that's A. If you finish it, go on, go on to B and C.

Slide:

Skyler's Idea

1. *Estimate*
2. *Swtch to fractions*
3. *Multiply across*
4. *Swich back to decimals*

Slide:

Showing Problem 2.1.

Chapter 2: Exploring 2.1A, Ellie and Drew Disagree
Approximate time 06:12 - 07:42 (Times from start of video)

Slide:

Explore

Real Time: 20 minutes

[1.7 lbs. of apples at\$0.50 a pound]

Line 1, 06:26 Maddie: Uh huh. I know that. It would be one eighty-five, right.

Ellie: Then you would get eighty-five cents.

Drew: How'd you get your answer?

Ellie: Okay -

Caleb: Drew, she changed this -

Ellie: Okay -

Drew: Thats half of seventeen.

Ellie: You don't want to know half of seventeen.

Line 10, 06:40 Drew: I do.

Ellie: Why?

Drew: 'Cause I know it'd be easier for like twenty to go down to ten.

Ellie: No. When you want to - seventeen divided by twenty, 'cause that's your numerator divided by your denominator, equals zero point eighty-five. Okay. And then, um, so that'd be your decimal so he has to pay zero, wait, eighty-five cents.

Line 20, 07:05 Caleb: So your number sentence is seventeen times five twice.

Ellie: One half, zero one fifty, one half -

Caleb: So you just did one half or you did fifty hundredths -

Drew: Times one half -

Ellie: Huh?

Caleb: Did you do fifty hundredths or just -

Ellie: Just one half.

Caleb: Okay.

Line 30, 07:22 Drew: So seventeen tenths times one half equals seventeen twentieths.

Ellie: Yeah.

Drew: That's what I got.

Ellie: I know. And then you have to take seventeen twentieths and make it into a decimal, so then you'd go -

Drew: Oh, so it'd be zero point seventeen

Ellie: No, you wouldn't. You'd go seventeen divided by twenty equals zero -

Line 40, 07:39 Drew: That's what I was just telling you. Um, like, I was going to divide it by two so it would be easier.

Chapter 3: Exploring 2.1A part 2, Nikki and Kaylie
Approximate time 07:42 - 08:49 (Times from start of video)

[0.4 lbs. of apples ar \$0.55 a pound]

Line 1, 07:44 Kaylie: Twenty-two hundredths. Yeah. It's over a whole. It doesn't make sense.

Nicky: It wouldn't be a whole.

Line 10, 08:16 Kaylie: Yeah, because then you would just - oh, hold on, hold on. 'Cause then if it's twenty-two hundredths, and then it's about two hundred, right? Okay. You'd have to do this times, er, divided by that, the numerator divided by the denominator, so it'd be two thousand two hundred divided by a hundred, and then it's twenty-two. You change your decimals.

Nicky: But it's not even close to our estimate - twenty-five. How can that be if you're timesing that by that? You're going to get twenty-two?

Kaylie: I'm confused.

Nicky: And equals two point two.

Kaylie: I got twenty-two.

Nicky: Equals -

Kaylie: Fifty-five -

Line 20, 08:49 Nicky: We messed up somewhere.

Chapter 4: The Teacher Helps Nikki and Kaylie
Approximate time 08:49 - 09:53 (Times from start of video)

Line 1, 08:49 T: Here's a whole pound of apples, right?

Slide:
Showing what teacher drew.

T: Cost her fifty-five cents. What if she only buys half of a pound? About how much do you think it should cost?

Nicky: About twenty-five, twenty-six?

T: Bingo. That's all there is to it.

Nicky: But our answer doesn't make sense.

T: Okay, so then let's figure out what you did wrong with your answer.

Line 10, 09:07 Nicky: But when I just did it on the calculator exact, to see what the exact answer was, we got two point two.

T: First of all, let's get rid of this, okay? And let's just figure out what we're doing.

Kaylie: Alright.

T: What, what did you have to - where's your actual number sentences that you multiplied?

Kaylie: First -

T: Four tenths times fifty-five hundredths.

Line 20, 09:26 Kaylie: We did -

T: Okay. Why forty hundredths.

Kaylie: Because they have to have the same place value.

T: Why?

Nicky: Oooh.

T: Why, why do you have to have the same place value?

Nicky: Multiplying. Oh.

Line 30, 09:41 T: I mean, it's okay, but you just got, I don't, but why you need to do that?

Kaylie: You don't.

T: Okay, so - I mean, you can do that if you want, but now -

Kaylie: Yeah.

T: You're working with even harder numbers to multiply by, so.

Kaylie: Yeah.

T: So let's try four times fifty-five hundredths and see what we get.

Chapter 5: Exploring 2.1A part 2, Violet and Maddie
Approximate time 09:53 - 11:27 (Times from start of video)

[0.4 lbs. of apples at \$0.55 a pound]

Line 1, 09:56 S: Yea but that's only in the hundredths place and that's in thousandths.

S (Violet): No, cause alright that's your number I did 40 times 55 which is there okay, and I got 22 hundredths

Slide:
Showing what Violet wrote

Line 10, 10:23 S (Violet): and then times the denominator its that, and then I dont know why I did that. That was wrong, I didn't get it. no you just leave that and ummm just minus zero just minus these two so its 22 and then these two ..

S(Maddie): That's Right

S (Violet): That makes more sense though

Violet: I said seventeen was two point zero.

Maddie: Two point zero times 50. I said it was a dollar first.

S(Violet): And then ten times ten is a hundred. Seventeen times you have to put that I got it

Line 20, 11:15 Violet: Seventeen times five is eighty-five. Eighty-five a hundredths, and then eighty -I'll put, I'll do that again.

Violet: That equals point eighty-five - Done.

Chapter 6: Exploring 2.1A part 3, Brooklyn and Allie.
Approximate time 11:27 - 12:55 (Times from start of video)

[3.2 lbs. of apples at \$4:10 a pound]

Line 1, 11:29 Brooklyn: So three point two, I'm going to change it to three point five, right?

Michaela: And then, and then, change, um, actually, you don't have to change the one to point one.

Allie: Yeah, 'cause it's just basically saying that it's like one times three point five.

Brooklyn: So, then, times -

Allie: One point one and then put equals, and then our estimate would be point three five.

Line 10, 12:07 Brooklyn: But we're supposed to change it to fractions.

Allie: Okay, well -

Brooklyn: So this would be three and five tenths - and then this one would be - so we would have to multiply that - one times three is three, and five times one is five -

Allie: And then

Brooklyn: No, ten times ten.

Michaela: No, unh uh. Repeat the ten.

Line 20, 20:39 Brooklyn: You sure?

Michaela: Yup.

Brooklyn: 'Cause I thought you - no, 'cause you go across, 'cause that's only like adding and stuff -

Michaela: Let me find it.

Allie: Okay, it says

Chapter 7: Summary 2.1A part 1, Violet and Maddie
Approximate time 12:55 - 15:00 (Times from start of video)

Slide:

Summary

Real Time: 30 minutes

The Launch and Explore phases for 2.1 took place on February 13, 2007, taking about 30 minutes of class time. There was a snow day on Feb. 14, 2007, so the class Summarized 2.1 on February 15.

Line 1, 13:08 T: We need everybody to be involved. So I want you to put your pencils and stuff down. You don't need to go back and fix anything because I'm not going to collect that and grade it, so there's no sense in you spending all your time fixing when you can just pay attention to what we're doing, okay? And the next problem that we're going to do today is another step up, more difficult. So you gotta stay with me here so we can figure out what's going on.

Line 10, 13:32 Violet: Oh. Um, our estimate was one and...yeah. Our estimate was a dollar. We changed one and seven tenths to two wholes and then we left fifty cents the same and we had a dollar for our estimate.

Violet: Okay. We changed one and seven tenths to seventeen tenths, which is an improper fraction. And then we multiplied that by five tenths, which is equivalent to fifty cents. And we got eighty-five one hundredths, which is also eighty-five cents.

Line 20, 14:15 T: And that seems reasonable 'cause you, you were predicting about a buck.

Violet: Yup.

T: What'd you guys think? Does that make sense? Okay. Thanks, girls. I'm just gonna do something on here. I'm just gonna write it this way so we can just look at this for a second. How do we do multiplying with fractions again?

Jesse: Numerators times numerators -

T: Right. Numerators times numerators, and -

Class: Denominators times denominators.

Line 30, 14:45 T: Okay. So I'm going to come up here and I'm going to write your answer up here, okay? So this number that was tenths and this number that was hundredths ended up to be hundredths, yes, or, or they called this number tenths. Okay. Now, let's go to the next one.

Chapter 7: Summary 2.1A part 2, Schuyler and Hannah
Approximate time 15:00 - 16:01 (Times from start of video)

Line 1, 15:02 Schuyler: Well, we did, um, four times fifty-five and that got us two hundred and twenty, and then we did ten times a hundred and that got us a thousand.

T: Okay -

Hannah: We switched over into a fraction because the four was in the tenths place -

T: Okay. And the fifty-five

Hannah: Was in the hundredths place.

Line 10, 15:23 T: Okay. And then what's your answer look like as a decimal?

Schuyler: Zero point two -

T: Two hundred and twenty in the thousandths place.

Jesse: You could just do twenty-two.

T: Right.

T: Okay. Same thing, though, right? Okay. Thanks, you guys. And that would be about twenty-two cents, right?

Student: Yup.

T: Now, does that go along with the estimate?

Line 20, 15:45 Student: Yup.

T: Those are pretty close. I'm just going to write this underneath your fractions. So, we had tenths and we multiplied it by hundredths and our answer ended up in the thousandths, right? Tenths, because when we multiply we multiply those denominators?

Chapter 9: Summary 2.1A part 3, Allie's Group Makes an Error
Approximate time 16:01 - 17:43 (Times from start of video)

Line 1, 16:03 Brooklynn: Okay. It was three and two tenths and we switched that to three and five tenths which is, um, this is in fractions. Then we did one and ten, one and one tenth is what we put it as our fraction, then we multiplied across and that's, um, our answer we got is three and five one hundredths and then that would be the decimal.

Student: So, about three dollars.

Line 10, 16:39 T: Okay. There's gotta be a better way to estimate than to do all that work. So let's go back, let's go back. Is there another way - look at your original problem. When you're estimating you're trying to round them to really easy numbers. So three and two tenths is really close to what, guys?

Class: Three.

T: It's really close to three pounds, right? How about a buck ten? What's that -

Class: One.

T: One. So three times one is what?

Line 20, 17:01 Class: Three.

T: Bingo. In five seconds we got a number that's almost exactly like you, you got after all that work.

T: Okay. Talk about actually getting the answer, then. How did - how'd you do that?

Line 30, 17:39 Michaela: Um, we um, I did it in fraction form, so I did, um, three and two tenths times one and one tenth and I got three and two hundredths because three times one is three and then, um, two times one is two and ten times ten is a hundred and in decimal form it does, it looks like this.

Chapter 10: The Class Makes a Correction**Approximate time 17: 43 - 19:45 (Times from start of video)**

Line 1, 17:45 Allie: Ellie?
Ellie: Well, what I did was, I did thirty-two tenths, um, times -
T: Okay. Times eleven tenths. And what did you get?
Ellie: Um, three hundred and fifty-two hundredths.
Jesse: Yeah, that's what I did.
T: Okay. So we need to talk a second. How is that different from what this group did to multiply?
Line 10, 18:23 Allie: Well, they made improper, but we timesed the wholes with the -
T: But is that okay? Did - when we multiply with fractions could we do that?
T: Could we?
Class: No.
T: Could we just multiply whole by whole, fraction by fraction - I don't think we can because you're getting a different answer.
T: What, what is our algorithm, guys?
Line 20, 18:40 Class: Switch to improper fractions and multiply across.
T: Okay. Okay. Because the algorithm you guys are using when we did multiplication of fractions we discovered that didn't work. We can't just do whole number times whole number, fraction by fraction.
Kristen: You have to do a whole number times a whole number, and then one of the fractions times the whole number and
T: Yeah. There are a lot more steps. Do you remember that?
Line 30, 19:03 T: So if we use this algorithm where we switch over to improper fractions, we're going to end up with three hundred and fifty-two hundredths. Could you guys write that as a decimal number, though, 'cause we're trying to switch it back over to decimals now. Three wholes and fifty-two hundredths. Okay, are we, are we okay? You guys see what, what happened there? I think we just, we didn't use the right algorithm, 'cause we can't do whole number times whole number and fraction and times fraction. We gotta - like
Line 40, 19:41 Kristen said, it's much more involved, the steps. Okay. Thanks, guys.

Chapter 11: Summary 2.1A part 4, Jesse.**Approximate time 19:45 - 20:48 (Times from start of video)**

Line 1, 19:45 Jesse: Since that was a pretty round number, one and five-tenths, I just rounded it up to two 'cause I'm just estimating. So I did two times two and that got me four. And then I switched this over to fractions, which that'd be one and a half or three halves, and I did three halves times three halves. That got me nine fourths or two and one fourth. Then I switched that back over to decimals and that got me two and twenty-five hundredths.

Line 10, 20:21 Kristen: Um, another way I did it was I did fifteen tenths times fifteen tenths.

T: Okay. Can, can we write that on here? You did fifteen tenths times fifteen tenths.

Kristen: And that got me two hundred and twenty-five hundredths.

T: And then how did you write that as a decimal?

Kristen: Um, two and twenty-five hundredths.

T: Okay. Thanks, Jesse.

Chapter 12: The teacher Highlights 8 Number Sentences**Approximate time 20:48 - 22:08 (Times from start of video)**

Line 1, 20:49 T: I'm gonna highlight some things that I want you guys to look at up here. I want you to take a look at - actually, what I'm gonna do is I'm gonna write this decimal number and this decimal number and this decimal number like that, okay? This was our number sentence in decimals, and this was our number sentence in fractions. Okay? If you look at this - I want you to look at this and this. Uh, let's see here. I'm going to write decimal number times

Line 10, 21:32 decimal number equals decimal. I want you to look at these two number sentences, and then because Kristen used denominators that have place values, I want you to look at this for a second, and then I'm going to write this underneath it. Okay? So now I want you to look at those eight number sentences and see if you notice anything going on here. Do you notice anything about this and this, this and this, those two?

Chapter 13: Nikki Spots a Pattern**Approximate Time 22:08 - 25:27 (Times from start of video)**

Line 1: 22:10 T: Nicky, what do you see?

Nicky: If you take away the decimal point, you have your, uh, top number.

T: Okay. Hold on. So if I take away that decimal point and take away that decimal point, am I going to have seventeen times five? And is that what I have in my numerators? Yes? Okay.

Student: And then the place value, your bottom, you know your denominator has a bigger place value.

Line 10, 22:35 Kristen: Yeah, 'cause when _____ was in tenths spot, and you took away the decimal so it would be tenths, and then five was in the tenth spot, too, and you took away your decimals.

T: So what are tenths times tenths always going to be?

Class: Hundredths.

T: Hundredths. Hmmm. Let's look at this one for a second. Let's do what Nicky just said and let's take out the decimal point for just a second. We would have four times fifty-five, right? What is four times fifty-five - is that kind of like what we did with our numerators? What is four times fifty-five?

Line 20, 23:10 Class: Two hundred twenty.

T: Two hundred and twenty. But we don't have four times fifty-five. How much smaller is this number? Wasn't it four what?

Class: Tenths.

T: Tenths.

T: But these are fifty-five what?

Line 30, 23:34 Class: Hundredths.

T: Hundredths. What are tenths times hundredths?

Class: Thousandths.

T: Thousandths. So can I make sure my answer is in the thousandths place?

Class: Yup, yeah.

T: You mean I can just pull out my decimal point, solve it, and then put the decimal point back in?

Class: Yup. Um hmmm.

Line 40, 23:55 T: Let's look at this number. Three point two times one point one. If I took out my decimal points, what would the problem be?

Class: Thirty-two times eleven.

T: Thirty-two times eleven, and we know that's three hundred and fifty-two. But did I actually have thirty-two, or did I have thirty-two what?

Class: Tenths.

T: Tenths. And I had eleven what?

Class: Tenths.

T: Tenths. So my answer's gotta be what?

Line 50, 24:18 Student: One thousandths -

T: Tenths? Well, what's tenths time tenths?

Class: Hundredths.

T: Hundredths. So this has gotta be three hundred and fifty-two -

Student: Hundredths.

T: Hundredths.

Student: Oh.

Student: That's cool.

Jesse: Nicky just found it.

Line 60, 24:32 T: Can we try it one more time? Take out our decimal points. What's fifteen times fifteen?

Class: Two twenty-five.

T: Now this is the problem, though. Once I get my answer in whole numbers, how do I know where to put my decimal point in? Nicky, how do we know?

Nicky: The place value. Because if it's at hundredths and the other one's at hundredths, you times them.

Line 70, 24:53 T: Okay. But this is at what?

Class: Tenths.

T: Tenths. And this is at what?

Class: Tenths.

T: And if I times ten times ten, what do I get?

Class: Hundredths; a hundred.

T: So can I make this answer in the hundredths place?

Student: Yeah.

T: How do I do that?

Line 80, 25:07 Student: By putting the decimal after the first two.

T: Right here?

Student: Yeah.

T: So if I want to make that two hundred and twenty-five one hundredths, would I write it like this?

Class: Yeah, yup.

T: It can't be that simple.

Student: It didn't seem that simple at first.

T: Let's try some more for a minute.

Jesse: Well, neither did multiplying fractions.

Chapter 14: The Teacher Checks for Understanding**Approximate Time 25:27 - 28:10 (Times from start of video)**

Slide

Teri tries another problem to check on the procedure proposed by Nikki.

Line 1, 25:41 T: Let's times it by three hundredths, okay? What I hear Nicky saying is - let's just take those out for a second - and the problem becomes twenty-five times three. Do we already know that?

Class: Seventy-five.

T: Seventy-five. But, now how do we figure out where we want to put our decimal point back in?

Brett: You put it right in front of the seven.

T: You put it here? So Brett says there.

Line 10, 26:04 Class: Yup, yeah.

T: You agree?

Class: No, no. No, wait a minute. No.

T: Okay. Can we, can we say why? Why does it go here?

Student (unidentified): 'Cause it's in the hundredths place value, so you -

T: Is it?

Student (unidentified): You have to add the the zero

Line 20, 26:18 T: But, but this is in the hundredths and that's in the hundredths. So, careful.

S (unidentified): We, we have to add a ...

T: This is really twenty-five one hundredths, and this is really three one hundredths, so I'm going to have seventy-five what - hundredths?

Class: No. Thousandths. Ten thousandths.

T: Ten thousandths.

S (unidentified): You you need to add 2 zeros.

T: Maybe we should stop, we should keep switching to fractions.

Line 30, 26:40 Class: No, no.

T: But we're not ready to not switch to fractions.

Student (unidentified): That's true.

T: Because this number isn't twenty-five, guys.

Student (unidentified): It's twenty-five hundredths.

T: It's twenty-five hundredths. This isn't three - it's three hundredths. What are hundredths times hundredths?

Class: Ten thousandths.

Line 40, 27:00 T: Ten thousandths. Look how teeny tiny the answer is.

T: Um, let's take fifty-four times point oh two. How about if we try that?

Student (unidentified): Alright.

T: Okay. You want to, you don't, you don't want to deal with fractions, do you? So let's get rid of the decimal point, so what's the problem?

Class: Fifty-four times two equals a hundred and eight.

Line 50, 27:24 T: A hundred and eight. But the answer can't possibly be a hundred and eight.

T: How much smaller - how much -here's the here's the answer if it's a whole number. But what do I have to do, how much smaller does my answer have to be?

Class: You have to add a zero. You have to have two zeros. A zero before it.

T: I hear this, and I hear this.

Class: No, one. One zero. One zero. Two zeros. Two. Two.

Line 60, 27:44 T: Well, how about if we prove it. This isn't fifty-four, it's fifty-four -

Class: Hundredths.

T: Hundredths. This isn't two, it's two -

Class: Hundredths.

T: Hundredths. So it can't be a hundred and eight. It's got to be a hundred and eight what?

Class: Ten thousandths.

T: Ten thousandths. Which one of these is in the ten thousandths place?

Class: The second one. The first one, the first.

Line 70, 28:08 T: Tenths, hundredths, thousandths -

Class: Ten thousandths.

T: Ten thousandths.

Chapter 15: Allie summarizes the Procedure**Approximate Time 28:10 - 30:09 (Times from start of video)**

Slide:

Allie proposes an algorithm.

Line 1, 28:21 Allie: Um, well, first you should like, first you should multiply the numbers that are, um, behind or in front of the decimal, then you multiply what they, what their place value is, and then you put in into decimal numbers.

T: Okay. So let's try that. Let's take, um, a marker that works, and let's do, um, how about this?

Class: So, thirty-three times three -

Line 10, 29:00 T: Okay. So if we take it out we've got thirty-three times three, right.

Class: Ninety-nine.

T: Ninety-nine. But we don't really have thirty-three. We have thirty-three what?

Studen(unidentified): Tens.

T: Tenths. We don't really have three, we have three what?

Class: Thousandths.

T: So what does my answer have to be in?

Class: Ten thousandths.

Line 20, 29:14 T: Ten thousandths. So I need to have ninety-nine ten thousandths. How am I going to write that?

Class: Zero point zero zero nine nine.

T: Okay. So what I heard Allie say is "Multiply them as whole numbers, and then multiply your two place values, and then make sure your place value ends up that way." Is that what you said, Allie?

Line 30, 29:50 T: Whether you're actually switching it over to fractions or not, it doesn't matter whether you actually do it. But what I hear you saying when you're talking through, you're sort of doing that, right?

Class: Yeah.

T: What I hear you saying is, "This isn't really thirty-three, it's thirty-three tenths." "This isn't really three, it's three thousandths." And then you're multiplying. So today I want you to think about this when you tackle the next problem, because it's about to get a little bit tougher.