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Transcript for October 23- 27, 2006

"Student Discourse."

Students are seen talking to each other about the mathematics they are investigating, in

Bits and Pieces II, Using Fraction Operations,

Investigation 3:

Problem 3.1, "How Much of a Pan Have we Sold", and

Problem 3.2, "Finding a Part of a Part," and

Problem 3.3, "Modeling More Multiplication Situations."

The video was shot in real time and edited to 14 minutes.

Bits & Pieces II, Investigation 3

Class: 6th Grade

Date: October 23-27, 2006

Chapter 1: A Proposed Algorithm**Approximate time 00 - 01:26 (Times from start of video)****Slide:**

Students have solved Bits and Pieces II, 3.1 and 3.2, and have proposed an algorithm.

Slide:

Showing Student poster with algorithm.

Line 1, 00:25 S [Nikki]: Should you draw a picture, took, like -
Teacher: What do you think? Do you think you need a picture in your algorithm, or no?

S [Nikki]: Because, it should, because sometime, I don't know, maybe some, one of these times it might not work, it might, it's probably not going to, but one of these times it might not.

S [unidentified]: That's how you do it, though.

Line 10, 00:44 S [Becca]: It's going to work because it, if it wasn't it, it probably wouldn't have worked for all of them.

S [Hayden]: She's taught us that that's how you do it.

Teacher: Okay, I'll tell you what, guys.

S [Nikki]: What if you had one more of like something, if you had one more?

Teacher: Oh, I just set you up. It's like I paid you to say that. That's exactly what we're going to figure out tomorrow. What happens if I don't just have a fraction of a fraction, if I don't have a part of a part? What if I have a fraction of a whole number? What if I have a fraction of a mixed number? What if I have a mixed number times a mixed number?

••

S [Hayden]: Sweet.

Teacher: Sweet?

S [Hayden]: Mixed numbers are the easiest -

Teacher: You think so?

S [Hayden]: A mixed number times a mixed number because you probably do a whole times a whole and then -

Line 30, 1:23

Teacher: Maybe. That's what we're going to try to figure out tomorrow.

Chapter 2: A Proposed Strategy**Approximate time 1:26 - 2:52 (Times from start of video)**

Slide:

Students are discussing the Getting Ready for Bits and Pieces II, 3.3. a girl proposes rewriting the mixed numbers as improper fractions.

Slide:

Showing Problem 3.3, Getting Ready

Line 1, 1:47

Teacher: Kaylie, what do you think?

Kaylie: To make it less confusing, maybe if you changed the two wholes into halves, like, for, five halves -

Teacher: Oh -

Kaylie: So maybe -

Teacher: Would that help us?

Class: No.

Line 10, 2:03

Teacher: What if we called this five halves of four sevenths?

[comments from class]

Teacher: But could you multiply that using our algorithm?

Class: Yeah.

Teacher: Let's do it just to see what we get. Could we do five halves of four sevenths? What would we end up with?

S_(unidentified): Fourteen twentieths -

S_(unidentified): Twenty fourteenths -

Line 20, 2:25

Teacher: Actually, twenty fourteenths, right? And what is that the same as?

S_(unidentified): One whole and six fourteenths.

Teacher: One whole and six fourteenths. Hmmm.

S_: _____

Teacher: Is that about - now these are estimates. Is that close to this estimate -

Class: Yes. No.

Teacher: Or no?

S_(unidentified): Not really.

Line 30, 2:44

Teacher: No?

Class: Yeah, yes.

Teacher: Isn't that about -

Nicky: 'Cause you've got to divide -

Teacher: Almost one and a half, and that's one and a fourth. Nope. We're not even close? Oh, okay.

Chapter 3: An Estimate for $2/3$ of 16**Approximate time 02:52 - 04:55 (Times from start of video)**

Slide:

Two girls discuss an estimate for $2/3$ of 16.

Slide:

Showing Problem 3.3

Line 1, 3:10 Nicky: Thirty two, forty eight - that's not even close to sixteen, which I got. So I don't - that's my estimate.

Allie: Yeah. That's what I got, too. I got sixteen for my estimate -

Nicky: You guys -

Allie: The estimate doesn't necessarily have to be like extremely close -

Line 10, 3:33 Nicky: You want to know an easier way to do it instead of, uh, doing sixteen, do two thirds - draw a bar and then two thirds and then six - and two thirds and sixteenths.

Allie: I was going to do that. I don't know if that'll work, won't it?

Nicky: It will. It's multiplication.

Taylor: That's what -

Allie: Oh, yeah, but I talked to Miss _____ and she said that's not what they're asking.

Nicky: But it's not.

Line 20, 3:55 Taylor: 'Cause there's sixteen wholes, it's just not one whole.

Allie: We both - it would still be the same answer, though. Wouldn't it still be the same answer?

Nicky: It would?

Allie: 'Cause I said two thirds of six - no, I said sixteen of two thirds, but she said that I couldn't do that -

Line 30, 4:17 Nicky: Okay. So I'm less than a whole, and I'm wondering why I'm less than a whole. My estimate is sixteen, and then I'm less than a whole there.

Allie: Well, see, if you were to convert this over to, uh, some other number, it would probably be less than - actually, you know, that doesn't make sense.

Nicky: That's what I was saying. Eleven equals eleven over twenty four -

Allie: Well, what if you made this into, like, half? What if you timesed half by sixteen, 'cause this is close to half and a whole, kind of.

Line 40, 4:47 Nicky: But then it would only - then it would equal, uh, nine - uh, eight, eight. And I'm still really far away.

Allie: I don't know. Okay, hold on. We're going to, let's try it this way.

Chapter 4: Multiplication of Mixed Numbers**Approximate time 04:55 - 08:49 (Times from start of video)**

Slide:

Two girls discuss how to use repeated addition to multiply mixed numbers.

Slide

Showing Problem 3.3D

- Line 1, 5:14 Kaylie: Because it's two and a third acre each day.
- Ellie: I know. But see, you have to have ten days and that would make sense. It'd be ten of those and then you have another ten boxes, but -
- Kaylie: But this is like going with that day, and this is like going with that day, and that's going with that day, and that's going with that day -
- Ellie: Uh, where's your tenth day?
- Kaylie: Tenth? I have it, right over here.
- Line 10, 5:45 Ellie: Oh. Oh.
- Kaylie: I did it in thirds, but then I substituted a half -
- Ellie: What halves?
- Kaylie: Ten and a half days of harvest. And I've done the ten days. I just needed to do the other half.
- Ellie: So, you done the ten days, well, what did that get you?
- Line 20, 6:16 Kaylie: That got me twenty - one, two, three, that's a whole - one, two, three, that's a whole - one, two, three, then I have another third -
- Ellie: Um, look, if you go, one, one third, two thirds, three thirds, that's -
- Kaylie: No. We're talking - yeah -
- Ellie: The whole would be over there, but -
- Kaylie: One, two, three -
- Ellie: Then the six would be over here, then the nine would be right there.
- Kaylie: But it's two acres.
- Line 30, 3:38 Ellie: So, okay, yeah, a third each day, okay?
- Kaylie: Yeah.
- Ellie: So if we're adding up all those days, one third, two third, three thirds, so that'd be one right there.

Kaylie: The thirds equal three and one third, and then we have the twenty, so that equals twenty-three and a third wholes.

Ellie: Yeah. I got, I got twenty-four and a half.

Kaylie: [unintelligible]

Line 40, 7:08 Ellie: what do you mean a half?

Kaylie: It says ten and a half days of harvest.

Ellie: Okay. So add on a half -

Kaylie: But we still have the half a day. We've done ten days but we still -

Ellie: _____ minus half of it off.

Kaylie: Do I need to do another day?

Line 50, 7:42 Ellie: Kind of. What would we have - half a day _____ - two and one third, you have to break that in half, divide it by two. So what would that get you?

Kaylie: Huh?

Ellie: You have, you took two and one third on a regular day, but -

Kaylie: Yeah.

Ellie: Today you only have it for half the amount of time. That means you only grew, say, half the amount of crop, so if you divide this by two, what would that get you? What's two divided, two -

Kaylie: Why did you have to divide it in half?

Line 60, 8:06 Ellie: Because you only have half the time. That means you only harvest half the amount.

•Kaylie: I'm still confused.

Ellie: Two divided by two - what's that equal?

Kaylie: But why are we doing two divided by two?

Ellie: Because you only have half the amount. Like, you have, I agree with this part, but then you have to add this half on. You only have this part right here. That's the only part you have, okay?

Kaylie: Yeah.

Line 70, 8:33 Ellie: So, what, now, now, see, you only have half a day, so you can't have, you can't harvest the same amount as you would do in a regular day. So, if you usually harvest two and one third -

Kaylie: Oh, I get it.

Ellie: So what would that equal?

Kaylie: One and one sixth.

Ellie: Exactly. So now add that amount to that.

Chapter 5: Writing a Whole Number as a Fraction**Approximate time 08:49 - 10:20 (Times from start of video)**

Slide

Students discuss rewriting whole numbers as fractions as a strategy for multiplying.

Slide

Showing Problem 3.3B

Line 1, 9:09 Teacher: Is it okay if I write on one of your drawings? Is it okay if I write here 'cause there's some room here?

Drew or boy in pink shirt: Yeah.

Teacher: Is that okay? Okay. So when I heard you say two thirds of sixteen, you ended up with thirty-two thirds. Yes. Yeah?

Kristen: It looks like it was, um, sixteen times two, and sixteen times two is thirty-two.

Line 10, 9:32 Teacher: Oh.

Taylor: And three times sixteen is three.

Kaylie: No.

Teacher: Three times sixteen is three?

S_: _____

Jesse: Oh, the denominator stays the same. The numerator changes, but -

Teacher: Hmmm.

Ellie: I know -

Kaylie: Oh -

Line 20, 9:45 Teacher: Did you guys notice that?

Kristen: I just noticed it.

Ellie: It'd be sixteen over one because -Teacher: I can write sixteen as sixteen over one?

Ellie: Yeah, because three times one equals three and then two times sixteen equals thirty-two.

Class: Yeah. Oooh.

S_(unidentified): 'Cause you have sixteen wholes.

Teacher: Should I write this a little bit, so you can see it a little bit better. So I can take any whole number and write it as a fraction by just putting it over one - sixteen oneths.

Line 30, 10:07 Class: Yeah, yes.

Teacher: Ooh. That's kind of cool.

S_: Awesome.

T: [Laughter]

Chapter 6: A Boy Explains His Strategy**Approximate time 10:20 - 12:52 (Times from start of video)**

Slide:

A boy explains his strategy for $\frac{2}{3}$ of 16.

Slide

Showing Problem 3.3B

Line 1, 10:37 Caleb: I did circles, and circles count for one ounce, 'cause the problem was chocolate chips, ounces. And I, so I made sixteen of those, and then I grouped them up, I grouped them up into fives, 'cause that's the closest I could find to sixteen being divided by an even number. And then, the last one I cut into thirds and added to each group, so I came up with a third of sixteen being five and a third, and then I -

Off-camera comments from class: I don't - I don't understand that.

Line 10, 11:16 Nicky: You kind of lost me when you said you were like, you just started talking really fast and then you lost me.

Teacher: Okay. So do you all understand that he has sixteen circles there to show sixteen ounces?

Class: Yeah.

Teacher: Okay. Now, can you back up and go from there, Caleb?

Caleb: Alright. I took the sixteen ounces and I grouped them off into fives -

Line 20, 11:33 Teacher: And how, why were you doing that?

Caleb: 'Cause that's the closest to an even number that I could get to, well, a whole number, that I could get to go into, uh, sixteen three times.

Class: Ooh.

Teacher: Okay.

Caleb: The closest I could get -

Teacher: Brett - excuse me just for a second. I'm just going to try to write something. Can you come over here for a second so I can get by your paper?

Line 30, 11:53 *[Teacher goes to board]* Caleb, is it true that you're trying to take sixteen and split it into three groups?

Caleb: Yeah.

Teacher: Okay. Now you following what he's doing?

Class: Yeah.

Teacher: Why would Caleb trying to be split it into three groups? Why? Because what?

Class: To find two thirds -

Line 40, 12:11 Teacher: Yeah. Because you're trying to get thirds, okay? And he said five's the closest he could get, isn't it?

Class: Yeah.

Teacher: Okay. So go from there, Caleb.

[Camera returns to Caleb at board]

Caleb: Then I got the one that was left over from when I grouped it off into fives. Then I cut that into thirds, and just put a third with each group of fives.

Class: Oooh.

Teacher: You following?

Line 50, 12:28 Class: Yeah.

Caleb: So that made it so a third of sixteen was five and a third, and then I just multiplied that by two and got ten and two thirds.

Ellie: Why did you multiply it by two, if you have -

Caleb: Because five and a third is one third, and I need two thirds.

Ellie: Oh.

Kristen: Oh, 'cause you need two more. Okay.

Classroom comments: *[Laughter]* Good job, Caleb.

Line 60, 12:52 That's a good idea.

Chapter 7: Connecting Whole number Multiplication to Fractions
Approximate time 12:52 - 14:28 (Times from start of video)

Slide:

A boy connects whole number multiplication to a strategy for mixed number multiplication.

Line 1, 13:03 Teacher: If I have ten and one half groups of two and one third - I saw some people trying to do ten times two is twenty, right? And then a half times a third equals one sixth - putting them together and getting twenty and one sixth. Okay. Why can we not just do that? Why does that not work? That doesn't give us enough. Why? Why not? Allie, why not?

Line 10, 13:41 Allie: 'Cause you have to multiply both numbers. Like you have to multiply ten times, um, a third and ten times two, and then a half, um, a half by a third and a half by a two.

Jesse: It's the same way when you're multiplying whole numbers. Like, fifty-six times twenty-two. You can't just split, um, split the fifty - fifty-six into fifty and six and multiply them separate. You have to multiply them together. You can't split both of them. You can split one but not both, like -
[Jesse runs to board]

Jesse: You'd have to do this, like twenty-two times fifty and then ...

Slide:

Showing what you can and can't do when you multiply 56 x 22.