Description: Fraction problems: Sharing Candy Bars (Overhead View) **Parent Tape: Fraction problems: Sharing Candy Bars (Overhead View)** **Date: 1993-10-29** **Location: Colts Neck Elementary School** **Researcher: Professor Carolyn Maher**	**Transcriber(s): Yankelewitz, Dina** **Verifier(s): Reid, Adrienne, Farhat, Marcelle** **Date Transcribed: Spring 2009** **Page: 1 of 13**

1.	00:18	T/R 1:	[writing on overhead transparency, figure 10-29-01] That each person in Jessica's group got how much more did you say Meredith? Got one fifth more than each person in Andrew's group. How many of you believe that? [all students raise hands]. Ok, you're gonna have to then convince me. But we'll let that hold for a minute. But who's the other group? [there was three groups] Ok, who was, who was in a different group? A group other than Andrew's and Jessica's group? Kimberly? Ahah. How many in your group, Kimberly?
2.	1:17	Kimberly:	There, we each got one and one fourth.
3.	1:19	T/R 1:	How many people in your group?
4.	1:20	Kimberly:	Eight
5.	1:21	T/R 1:	Eight people? And in your group got
6.	1:26	Kimberly:	One and one fourth.
7.	1:27	T/R 1:	One and one fourth. So the people in Jessica and Kimberly's group, right? You're claiming you got more. And the difference you claim is
8.	1:39	Kimberly:	Five, one fifth.
9.	1:44	T/R 1:	Wow, that's a good question. I don't know how you got one fifth. Um, it's sort of like saying to me, if I got a half, and Amy got a quarter, right? Who got more? I got more, right? I got a half, ok, and Amy got a quarter, but by your theory, you would tell me that I got, how much more?
10.	2:22	Meredith/ Students:	One fourth/one quarter
11.	2:23	T/R 1:	But you would have told me a half more, think of the way you did that problem.
12.	2:29	Meredith:	Oh
13.	2:33	T/R 1:	Is that right, Meredith? Right? Did I get a half more [Meredith laughs]. You all know I didn't get a half more. I got how much more?
14.	2:38	Meredith/	Oh./A quarter more

		students:	
15.	2:40	T/R 1:	A quarter more. But if I used your method of figuring out how much more I'd be subtracting the four and the two, and I'd end up with a half more. That sort of doesn't make sense, does it? You still believe that it's a fifth more for sure? How many of you are not so sure? Not so sure [all students raise hands] It's a good question. Hmmm, I don't know. Well, we ought to keep this question in mind and uh, we ought to try to answer it, don't you think? Ok? I guess maybe another way to ask that question might be, might be what? You tell me what you think the question is. What are the fractions that are of interest in this problem? What decides who got more, the people in Andrew's group or the people in Jessica and Kimberly's group? Meredith?
16.	3:56	Meredith:	I know that Jessica and Kimberly's group got more than Andrew's group did.
17.	4:01	T/R 1:	You know they got more, right?
18.	4:02	Meredith:	Right.
19.	4:03	T/R 1:	And what number tells you?
20.	4:06	Meredith:	Well, um, if they got, uh, one fourth, and one rod was like, the one rod, and you had ninths and you had fourths, if you had the fourths they would take
21.	4:24	T/R 1:	You're talking about ninths and fourths, is that right?
22.	4:25	Meredith:	Yeah.
23.	4:26	T/R 1:	You all agree that it's ninths and fourths that's at issue here? And it's not the one piece? So let's focus on the ninth, right, and let's focus on the fourth. So which one you're claiming is bigger?
24.	4:38	Students:	The one fourth.
25.	4:39	T/R 1:	The one ninth is smaller
26.	4:41	Students:	Yeah.

27.	4:41	T/R 1:	Did you ever see that symbol, smaller than? [Figure 10-29-02]
28.	4:43	Students:	Yeah
29.	4:44	T/R 1:	One ninth is smaller than one fourth? Ok? So I'm sorry, Meredith.
30.	4:54	Meredith:	And, um, if you take a one rod and you divide it into ninths and fourths, the fourths are going to be larger because they're less. So they're going to be larger. So each person is going to be getting a larger piece.
31.	5:00	T/R 1:	Ok, so you've convinced me that if I could imagine a rod that I call one, and I imagine four pieces and I think of one of those pieces, that's going to have what number name?
32.	5:14	Meredith:	Fourths.
33.	5:15	T/R 1:	And if I kept that same rod and I imagine nine pieces, one of those pieces will have the number name.
34.	5:21	Meredith:	Ninths.
35.	5:23	T/R 1:	One ninth. And you could imagine in your head without the rods and telling me that the one ninth, that the one fourth is
36.	5:29	Meredith	Bigger than
37.	5:30	T/R 1:	Bigger than the one ninth, or the one ninth is smaller than the one fourth. The question I'm asking is the difference one fifth? Now, could you imagine the fifth rod, what that looks like?
38.	5:41	Meredith:	Um, I think it would be the yellow rod, I'm not sure, I think it was the yellow rod that was the fifth.
39.	5:49	T/R 1:	Whatever you're thinking, you could imagine a fifth, you could imagine a fourth, you could imagine a ninth, do you imagine in your head, is my question, do you imagine in your head that the, if you'd compare the one fourth rod and the one ninth rod, the difference would be the one fifth rod, do you think that makes sense to you, as you're imagining this in your head?
40.	6:16	Meredith:	Ummm, if you put the four and the five together it would equal up to the

			ninth rod.
41.	6:22	T/R 1:	You think so? [mmm] I think we ought to get out the rods.
42.	6:23	CT:	Yeah.
43.	6:24	T/R 1:	I think we ought to get out the rods, what do you think? How many of you want to work on this? How many of you want to know how much more the people in Andrew's and Je- uh, Andrew's group, uh Jessica's group and Kimberly's group got than the people in Andrew's group. [Students raise hands, Dr. Landis enters with rods] Can somebody tell Dr. Landis the problem because she doesn't know any of the story of any of what happened and how this all came to be, could someone be so kind as to tell Dr. Landis the whole story? Kimberly do you want to give it a try? Dr. Landis? Do you want to hear what's going on?
44.	6:59	Dr. Landis:	I do want to hear it, yes!
45.	7:00-29:00	:	[Students and researchers discuss the problem off camera]
46.	29:00	T/R 1:	[off camera] Do a third and a fourth. Compare a third and a fourth, you've done that one, right. You've done a third and a quarter maybe if you do that it will help you understand how to do a fourth and a ninth.
47.	29:19	Michael:	[off camera] The quarters are these.
48.	29:21	T/R 1:	[off camera] Is there enough?
49.	29:24	Michael:	[off camera] These are the quarters
50.	29:25	T/R 1:	[off camera] He's thinking, he's thinking.
51.	29:38	Erik:	[off camera] My brain is very scrambled I have no idea what's going on.
52.	29:40	T/R 1:	[off camera] If you believe that you can do a third and a quarter, right? So what's the difference, between a third and a quarter? What's the difference?

53.	29:49	Michael:	[off camera] One.
54.	29:51	T/R 1:	[off camera] One what? What number name would you give to that white rod?
55.	29:56	Erik:	[off camera] One twelfth.
56.	29:57	T/R 1:	[off camera] One twelfth. You can do a third and a quarter, you said it's a twelfth, not one, right? Does that help you?
57.	30:04	Michael:	[off camera] Oh, I get it!
58.	30:04	T/R 1:	[off camera] You do?
59.	30:06	Michael:	[off camera] Yeah.
60.	30:07	T/R 1:	[off camera] Why? What do you get?
61.	30:10	Michael:	[off camera] Sort of like, um,
62.	30:13	T/R 1:	[off camera] What's a half and a third?
63.	30:15	Michael:	[off camera] A half and a third? The half is a half
64.	30:18	T/R 1:	[off camera] If I compared a half and a third, you wouldn't get one, would you?
65.	30:22	Michael:	[off camera] No.
66.	30:23	T/R 1:	[off camera] What would you get?
67.	30:24	Michael:	[off camera] One twelfth.
68.	30:22	T/R 1:	[off camera] Show me. You said a quarter and a third, right, you got a twelfth, now compare a half and a third.
69.	30:33	Michael:	[off camera] A half and a third?
70.	49:35 30:47	Erik:	[off camera] I think I have a conclusion.
71.	30:49	T/R 1:	[off camera] what do you want one to be in that?

72.	30:51	Michael:	[off camera] Oh I've got an idea!
73.	30:53	Erik:	[off camera] I do too, I do too. I think I got it somehow.
74.	30:56	T/R 1:	[off camera] Try this one.
75.	30:57	Erik:	[off camera] Dr. Maher, I think I have it somehow.
76.	31:01	Michael:	[off camera] It's a sixth!
77.	31:02	Erik:	[off camera] I think I got it, Michael I think I got it.
78.	31:06	Michael:	[off camera] Sixth, and then the thirds...
79.	31:12	Erik:	[off camera] Mike, I think I got it.
80.	31:16	Michael:	[off camera] It's one, what? It's one sixth. Look at that! It's one sixth.
81.	31:20	T/R 1:	[off camera] Wait a minute, a half and a third? A half and a third, it's not one, huh? And a quarter and a third what did you say it was?
82.	31:30	Michael:	[off camera] One twelfth.
83.	31:32	T/R 1:	[off camera] Now we have a fourth and a ninth.
84.	31:35	Erik:	[off camera] I think I just figured it out somehow.
85.	31:37	T/R 1:	[off camera] What did you figure out, Mi- Erik?
86.	31:40	Erik:	[off camera] Well what I did was I
87.	31:41	T/R 1:	[off camera] You're really trying to confuse me, you two. Michael's now sitting by Erik, and Erik's now sitting by Michael [laugh] and now you want to know why I call you by the wrong names. Ok, tell me what you figured out.
88.	31:51	Erik:	[off camera] Well I don't know, I did this thing, I don't know if it's, kind of tricky but - I said like this, three blues and then for the ninths I did light greens, and then for the fourths I did three browns and then I took a light green because I figured that evenly odd, even, odd it could take one

			and then put it and
89.	32:14	Michael:	[off camera] My first thing was that I got, that I could get ninths out of was eighteen so I made an eighteen rod and I couldn't get fourths out of it.
90.	32:18	T/R 1:	[off camera] Just think what you just did. You did very important things. You know what do me a favor, if you would build the two models you just made for comparing a half and a third and a quarter and a third on the board.
91.	35:47	:	[Michael and Erik build the following models on the OHP: an orange and red train with four light green rods, three purple rods, and a white rod, and an orange and red train with two dark green rods, three purple rods, and a red rod. Figure 10-29-20]
92.	40:00	T/R 1:	[talking to Erik, Michael, Kelly, Graham, David, and Meredith] How is that model related if at all to these models?
93.		:	[Students and researchers discuss the problem off camera]
94.	44:51	T/R 1:	Think about what is causing the difficulty, ok, Meredith? [to class] Ok, is this a good time maybe to pull together for a few minutes and do some sharing? [no] Is this a good time? [to Kelly] Keep your model here. [to class] Ok. Is it possible, can, can I have your attention for a minute, we have a little bit of extra time thanks to Dr. Landis, uh, she's given us a little extended time, but we have some interesting ideas here and I think it's really important to share our ideas, I see some wonderful models another model here, right, with, um, Mark and Audra, right? You have another model. I guess, um, I was very interested in listening to your ideas as I walked around and I heard um our, does anyone, did anyone change their mind what they thought the difference between, uh, one quarter and a ninth were? Did anybody change their mind? Some of you changed your minds? How many of you still aren't sure about that difference [some students raise their hands]. Ok, so, so we had a theory, let's call it Meredith's theory, but she may have changed her mind she may not have, but Meredith's theory seems to suggest that if you wanted to find the difference between one fourth and one ninth that it's one fifth. That was the theory that we were testing, right? Now, if you used that same theory and I asked you what the difference was between one quarter and a third, and you applied that theory, what would you have said the

			difference was between a quarter and a third?
95.	46:59	Meredith:	A quarter and a third?.
96.	47:00	T/R 1:	Using that same theory.
97.	47:06	Meredith:	A quarter and a third would be, well, how big would the third be.
98.	47:16	T/R 1:	Ok, well one of the gentlemen here who have built the models up here, can you all kind of listen for a minute to what Michael and Erik and um James have built
99.	47:37	Students:	James?
100.	47:30	T/R 1:	I'm sorry, not James, it's David.
101.	47:33	Michael:	[off camera] Um, uh, well, what me and Erik, me and Erik started building models like these to try and help us figure out how to one fourth and one ninth, and Dr. Ma- and um, and then we were on the edge of trying to find it out and then we had another idea we started just we lost the idea of that was that we had before and
102.	48:05	T/R 1:	[off camera] Do you want to tell us what that idea was?
103.	48:06	Michael:	[off camera]Well, that idea was, try to get, try to um find the number and divide, um, divide it and see if it equals nine, then you've got a ninth, but we found that every single one that we tried there wasn't a fourth if there was a ninth, and if there was fourth there wasn't a ninth. So, um, we, we, um, we decided to try a new idea it turns out when we, uh, when we tried the new idea, the first time we tried it we were wrong.
104.	48:39	T/R 1:	[off camera]What was that new idea?
105.	48:41	Michael:	[off camera]Well, I don't really remember what we were thinking.
106.	48:45	T/R 1:	[off camera] Was it the odd and even?
107.	48:47	Michael:	[off camera]Yeah, I think so, yeah, what I also figured, um, is that you, it's so hard, like if you had you had to make a model with one fourth and one eighth in it, we could make a ton of them, but it's hard to make a model that has an odd number, like one ninth, and a even number, which is one fourth. So I figured that that was really hard and we made only like

			two models or so of it and it was really hard to find to get a train to something like that.
108.	49:21	T/R 1:	[off camera] Ok, so where did that leave you. You told me there couldn't be any models when you had an odd and even.
109.	49:28	Michael:	[off camera] I know. But then we figured that it had to be, because there was no other way to do it.
110.	49:35	T/R 1:	[off camera]But you built two models here and you're comparing fractions where, you have an odd and even number on
111.	49:39	Michael:	[off camera] Well, I didn't really, I was just trying to get an idea from these old models and I didn't get one, but I guess Dr. Maher did, so she wanted us to come up and say what we were thinking, I was just trying to get an idea from it.
112.	49:57	T/R 1:	[off camera]When you compare this top one, what numbers were you comparing when you built this model here? [Continuing figure 10-29-20]
113.	50:02	Michael:	[off camera]One third and one fourth.
114.	50:04	T/R 1:	[off camera]And what did you find?
115.	50:05	Michael:	[off camera] We found that it worked.
116.	50:05	T/R 1:	[off camera]What worked?
117.	50:06	Michael:	[off camera]That an odd and an even can go into a whole.
118.	50:14	T/R 1:	[off camera]So, you mean you compared the quarter and the third, what did you find to be that difference?
119.	50:19	Michael:	[off camera]The difference would be, the difference would be one twelfth. But in this model with the half and the third it would be one sixth.
120.	50:30	T/R 1:	[off camera] Ok, so you could do that. Ok, um, alright, let's see now James did James has some idea here let's hear what James says and we all know that Graham and, why don't you sit down? Thank you very much, gentlemen. And let's, let's hear what James' idea is and then we'll hear if

			Graham and Kelly agree. Where did Graham go?
121.	50:52	James:	[at OHP] can I take this off?
122.	50:54	T/R 1:	Yeah, sure.
123.	51:35	James:	[James put an overhead transparency on OHP, Figure 10-29-21] Well, like, I got a huge model for this problem. First, but by experimenting I tried nine yellows and four oranges, for the ninths and the fourths. And I found out they weren't equal so I tried something else. I lowered its size so orange and uh the orange and the yellow and we got blue as the fourths and purple as the ninths and they were equal. So I just had to find a whole for that and I found out it was I just took three oranges and one dark green so then I had then I put up thirty-six whites on up to the whole and there, it took five whites to make the purple equal to the blue, so I think the answer would be five thirty-sixths.
124.	52:49	T/R 1:	[off camera] What do you think? Anybody do anything like that?
125.	52:51	Erik:	[off camera]Well I guess I sort of
126.	52:54	T/R 1:	[off camera] Oh, Erin, Jackie, Beth, what did you do? Did you do something like that?
127.	52:58	Erin and Beth:	[off camera] Uh, yes.
128.	52:59	T/R 1:	[off camera] Just tell us about it.
129.	53:02	Jackie:	[off camera] Um, well, we did the same thing we have the same fourths and the same ninths
130.	53:06	Beth:	[off camera]But we have a different whole.
131.	53:09	T/R 1:	[off camera]So you called one and you used different rods to show your one?
132.	53:13	Beth:	[off camera]Yeah.
133.	53:15	T/R 1:	[off camera]Ok, and so, uh, can you move aside a little bit, Erin, so the class can see? Uh, so your model here, it looks very much the same as

			James' model
134.	53:25	Jackie:	[off camera]Except we have, instead of three oranges and one dark green we have one dark green, one orange, one red, um, one black, one brown, and a light green.
135.	53:39	T/R 1:	[off camera]Ok, so what rod did you give the number name one quarter?
136.	53:46	Erin:	[off camera]Um blue.
137.	53:49	T/R 1:	[off camera]The dark blue? And what rod did you give the number name one ninth?
138.	53:53	Girls:	[off camera]Purple
139.	53:54	T/R 1:	[off camera]Did you do the same thing?
140.	53:55	James:	Yeah.
141.	53:56	T/R 1:	[off camera] Did anybody else do that? You did that and you did that and you did that and you did that? Ok, and so what number name did you give the white one?
142.	54:03	Girls:	[off camera]Thirty-sixths, one thirty sixth.
143.	54:06	T/R 1:	[off camera]One thirty-sixth? And what did you find the difference was between the ninth and the quarter?
144.	54:11	Jackie:	[off camera]Five thirty-sixths.
145.	54:12	T/R 1:	[off camera]Five thirty-sixths. How many of you got five thirty-sixths? I see. I see. Ok, what do you think? So, so you can actually see, what makes this problem so hard? What makes it so hard?
146.	54:33	Kimberly:	[off camera] The odd number and the even number.
147.	54:36	T/R 1:	[off camera] Pardon?
148.	54:37	Kimberly:	[off camera] The odd number and the even number.
149.	54:40	T/R 1:	[off camera] The odd and the even number? What about that makes it hard? You have a four and a nine.

150.	54:43	Kimberly:	[off camera] Because it's harder to make a model when you have an even number for one and an odd for the other.
151.	54:52	T/R 1:	[off camera] Ok, now have you learned anything on the models that you've seen today that might help you get some ideas for how to pick that number? If you remember that Erik and Michael when they compared a half and a third, what was your difference?
152.	55:08	Michael:	[off camera] A half and a third?
153.	55:09	Erik:	[off camera] A half and a third was
154.	55:10	Michael:	[off camera]Was one sixth.
155.	55:12	T/R 1:	[off camera] When you compared a half and a third it was one sixth. And when you compared a third and a quarter?
156.	55:19	Erik:	[off camera] It was, it was, one one twelfth.
157.	55:20	T/R 1:	[off camera]It was one twelfth. And when you compared a quarter and a ninth?
158.	55:29	Michael:	[off camera]A quarter and a ninth?
159.	55:30	T/R 1:	[off camera] One fourth and one ninth?
160.	55:32	Michael:	[off camera] Oh.
161.	55:33	T/R 1:	[off camera]It became, who did it here? You did it here, Erin and Beth you got five thirty-sixths.
162.	55:42	Michael:	[off camera]Oh, it sort of went up by six I guess.
163.	55:50	T/R 1:	[off camera]It's something to think about, isn't it? It's something to think about, right? Well we have here, thank you very much, and Kelly and Graham and all of those wonderful models, I'm going to keep this, that's lovely, thank you. How many of you believe the difference is five thirty-sixths, raise your hands. If you don't believe it, if you need to walk over to these models before we put them aside and see what they've done. When, we compared one half and a third, we got one sixth. When we compared a third and a quarter, right? We got one twelfth. When we compared a quarter and a ninth we got five thirty-sixths. [Writes on

			transparency: 1/2- 1/3 = 1/6, 1/3 - 1/4 = 1/12, 1/4 - 1/9 = 5/36, Figure 10-29-22.] Is there anything in these numbers that relate to the model you built? That's my question. We'll let you think about that. If you haven't built the model, I really think we have enough people here, we have Kelly and Graham, we have the table in the back, what do you think? Yeah. Ok, so we can think about them. I'm wondering if there's anything that might give you a clue to building your models in the future. Maybe you ought to try to build some more and study these a little bit. It's something to think about. Ok, I'm going to see you on Monday, good! We get to talk some more. Thank you very much and thank you for staying longer, I appreciate, Mrs. Phillips, the extra time. A really good job.
164.	57:53-end		Clean up