Description: Fraction problems: Sharing and Number Lines (Side View) **Parent Tape: Fraction problems: Sharing and Number Lines** **Date: 1993-11-01** **Location: Colts Neck Elementary School** **Research: Professor Carolyn Maher**	**Transcriber(s): Schmeelk, Suzanna** **Verifier(s): Cann, Matthew; Farhat,Marcelle** **Date Transcribed: Spring 2009** **Page: 1 of 22**

Line	Time	Speaker	Side View
1	10:40	RT1	Well, Good Morning
2		Class	Good Morning
3		RT1	It's Monday. It sounded like that last Monday, too. You know today we have a visitor another visitor. And maybe, Professor Davis can say a few words about our visitor.
4		RT3	Okay. Do you know what country the city of Oslo is in?
5		Student	Norway
6		RT3	You are Right. Well that is where he is from. Professor Gunnar Gjone is from Oslo, Norway and he is here to see what we are doing.
7		RT1	That's quite a long distance isn't it?
8		Class	Yes.
9		RT1	Okay. Umm it is Monday morning that's true - and I know you all had a wonderful weekend . Yes. It was a very special weekend wasn't it?. Too bad it rained but I bet you made the best of it. But it is Monday and I'm wondering if you could think really hard and sort of help me and try to help us remember what we were doing on Friday morning? Do you remember how it all happened? Was it Friday? Something you were doing on Thursday led to something you were doing on Friday. Remember? Oh, look, we have 3 people, 4 people, 5 people remembering what we did on Friday. I know it takes a while. Thinking hard? It's okay to talk with your partner.(chatter) More people are remembering. Okay. There are still some people are not remembering. I can't believe James doesn't remember. I think James remembers. Can someone help James? Are you helping James remember? Oh, he says. Who wants to tell our visitor what happened? Graham, your hand was up first, do you want to tell our visitor what happened?

10	12:51	Graham	Well, we had a candy bar .. Tuesday.(Inaudible) And then We had to make a problem and use our rods to see who got more and by how much.
11		RT1	Okay, can someone tell us how that story end? Did it? Who got more and who got how much? Who wants to tell us the rest of that story? Mark?
12	13:45	Mark	Well, the people that got one fourth got more by five thirty-sixths.
13		RT1	Five thirty-sixths more? How many of you remember that? Five thirty-sixths more.
14		RT1	How many of you believe that?
15		RT1	Okay so, you all seem to believe it, but you don't all quite remember it. But do you remember how you did it? Do you remember how you were able to show that they got more by five thirty-sixths?
16		RT1	Does anyone want to kind of review how you showed that one fourth was larger than one ninth by five thirty-sixths?
17		RT1	Can you kind of remember it in your head without the rods, how that worked, James?
18		James	Umm .Well, we had to thirty six whites, And it took five whites to get from one-fourth to one-ninth one ninth, or one ninth to one fourth, so five thirty-sixths to get.. is the answer.
19		RT1	So that's the difference? (James –Yeah)How many of you remember that?
20		RT1	Do you know what I am curious about? Some of you said one fifth. In fact everyone in this class thought the difference would be one fifth before you did the activity. Do you remember that? I asked you.
21		Class	Um-hum.
22		RT1	I'm kind of curious, what made you think one fifth? Brian?
23		Brian	Well, it's the same, well me and Meredith kind of thought that it was the same as nine minus four equals five.

24		RT1	So you were thinking whole numbers.
25		Brian	Yeah
26		RT1	Does it work that way with fractions? What do you think Meredith?
27	15:11	Meredith	Well if you put the blue which has nine ones in it, and the four plus the five rod then you have nine.
28		RT1	You said if you took the blue, and what number name are you giving that?
29		Meredith	Well I'd call it nine
30		RT1	You're going to give it nine, and what was the other rod?
31		Meredith	The four rod which I think was the purple rod
32		RT1	You're calling the purple, four?Is that what you said?
33		Meredith	Yes, and then the yellow would be the five and it would equal up to it. That is what I thought at first
34		Erik	[*Shaking-head, 'NO'*] I think that …
35		RT1	What is wrong with that thinking? [*Meredith simultaneously says that was what she thought at first*] I mean five plus four is nine, I believe that ,does that that work? Erik did you want to say something?
36		Erik	I think that it doesn't make sense because how could the blue rod be one ninth of one model and the purple rod be one fourth when the blue rod is larger than the purple rod? … Maybe If you made a super gigantic train than maybe the blue rod would the nine but I would think that the purple rod, more sensibly the purple rod or the yellow rod would probably be the nines and the blue rods would be the fourths..
37		RT1	I heard Meredith call the blue rods
38		Erik	Yeah I know I just don't think the way Meredith explained the way she thought before made a lot of sense..
39		Meredith	I know I changed my answer.

40		Erik	I just think the five rods equals up to the same as five thirty sixths
41		RT1	So you think that the five thirty-sixths is somehow related.
42		Meredith	Um-hum
43		RT1	That's an interesting idea. Do we have enough of these? How is that, is that better?
44			Okay. So that is a start that can get you very confused. Is that right?
45		Class	Yeah
46		RT1	If you call the blue rod nine, then you could say then the white rod is one, pink rod is four, yellow rod is five and you proved five plus four is nine. You actually proved five plus four is nine. You proved it doesn't quite work that way for fractions, does it? What do you think?
47		Class	[*Quiet*]
48		RT1	Okay. That was very interesting, so, I was just wondering when you saw the big model that was built and you saw that the person that got one quarter of the candy bar got five thirty-sixths more than the person who got the ninth of the candy bar, is that much of a difference do you think?
49		Jessica	No, I think that there is twenty-five people in the class and that is an odd number, so so umm you cannot have all even groups, that is why I think some people got one ninth and one fourth.
50		RT1	I wonder if there is a better way and I want you to think of a way, I want you to follow this pattern and I want you to think about, of sharing those three bars of candy so everyone got the same amount exactly. Think about a way, think about that.. [*Andrew raises his hand*] Andrew, any ideas?
51		Andrew	Well, what I did one day we had to do for homework, that we had to divide equally, so I

			came up with the answer that everyone got one and one fifth.
52		RT1	How did you do that?
53		Andrew	Well, there were three candy bars and each one had ten rectangles in it. So I took twenty five of them and circled it and put one. Then, the five left, if you divided them up into fives it would be five, ten, fifteen, twenty, twenty five, so each person would get one and one fifth.
54		RT1	That is an interesting conjecture isn't it. Did you hear that what Andrew said? How many of you follow what Andrew said?
55		Class	[*Few students raise their hands.*]
56		RT1	I wonder if there is a way to test that, that it would have been, uhm, okay. Could you draw us a picture or something to show us your way. Andrew, how did you show that?
57		Andrew	Yeah, well, I made the three candy bars
58		RT1	Can you try to all imagine what he is doing? The three candy bars.
59		Andrew	With the ten pieces in them
60		RT1	Ten. Ten. Ten. Can you all imagine that?
61		Class	Umm-hum [*'Yes'*]
62		Andrew	Then, I took two candy bars and five pieces of the other one to make twenty five.
63		RT1	Okay so everyone gets one of those thirty pieces and there are how many left over?
64		Class	Five.
65		RT1	Five. Do you all follow that? How many people follow that so far?
66		Class	[*Some students raise their hands.*]
67	20:55	RT1	So, thirty pieces and everybody got one and five left over. Okay
68		Andrew	Then those five would be just like one candy bar but it would be smaller so you divide them into fifths—five, ten, fifteen, twenty, twenty-five.

			There are enough people so everyone get one and one fifth.
69		RT1	What do you think about that? Would that have been fairer, do you think? Get one and one fifth compared to some people getting one and one quarter and some people getting one and one ninth.
70		Class	[*Mumbles 'Yes'*]
71		RT1	What do you think?
72		RT1	Is one and one fifth more or less than one and a quarter? More or less? What do you think?..Is one and one-fifth more or less than one and a quarter? Those of you in the group with one and a quarter now got one and one fifth would you have gotten more or less? One and one fifth more or less?
73		RT1	Danielle?
74		Danielle	Less.
75		RT1	Okay. How many think it's less?
76		Class	[*Some students raise their hands.*]
77		RT1	Why?
78		Danielle	Because that's [*five*] a bigger number, so when you have a bigger number, you get less.
79		RT1	Which is the bigger number?
80		Danielle	Five
81		RT1	Five. Okay. What do you think about that? What do you think? Brian?
82		Brian	Well, I agree with her. If you have a bigger number than you need to take like say, see its one and one fifth. If it is one fifth, then there has to be five of them in one whole. And If there is one fourth, And If they are quarters, then you only need four of them to go into one whole, so five is

			a bigger number and so it needs more to fill up one whole. So its so it's less.
83		RT1	[*Writes one half, one third, one fourth and one fifth*] So, if I were to say things, like one half, one third, one fourth, one fifth, right? If I were talking about these numbers then would you know which are bigger and which are smaller? How many think you know which of these numbers are bigger and which are smaller? Who could explain why? Can you imagine the model?
84		Class	[*Many students raise their hands.*]
85		RT1	David, what do you think?
86		David	Well I think that like if you have about this big then one half would be right in the middle [*motions ½ on a imaginary unit*] then one third that would be kind of smaller [*motions to where one third would cut on a unit]* because you have to fit three pieces in there and then one fourth would be even smaller than one-third.
87		RT1	Want to come draw that for me? You all hear what David is saying?
88		David	[*Walks up to OHP in front of the room.*]
89		RT1	Sure, Want to draw your one. Call something one and draw it?
90		David	Umm Maybe umm the orange
91		RT1	Just sketch it …Sure
92		David	Umm like If this is the one here
93			… then one half would be there…and then you
94		RT1	Can you mark one half right where you put it, like put it right underneath so we can see it?
95		David	What do you mean?
96		RT1	Just draw the number one half . Put one half where you want to show one half.
97		David	One half, Then, one third.
98			Then one fourth.

99		RT1	Then, one fifth. Thank you very much. Does anyone have a question to ask David before he sits down about what he has done? Can you imagine this with the rods? Thank you, David. Where do you think one fifth would be Meredith?
100		Meredith	The whole would be divided into fifths.
101		RT1	So do you think it would be to the right of a quarter or to the left of a quarter?
102		Meredith	Left.
103		RT1	To the left, So somewhere like this maybe?
104		RT1	I'm going to do this. I'm going to call this zero and I'm going to call this one. I wonder who would like to come up here and mark where the number one half would be? Michael?
105		Michael	[*Walks up to OHP in front of the room.*]
106		RT1	Do you Want to mark one-half underneath where I put the zero and the one.
107		Michael	[*Places the number midway between 0 and 1.*]
108		RT1	Thank you, Michael. How many of you agree with that? You would put it in the same place.
109		RT1	What do you think the next question will be?
110		Class	[*Inaudible*]
111		RT1	So, where do you put one third and one fourth? Would you call on someone? Erik?
112		Erik	[*Walks up to OHP in front of the room.*]
113		RT1	You got to watch because if you don't agree you've got to say it. Approximate is okay, Erik.
114		Erik	Approximate[*Places the number one third to left of one half.*]
115		RT1	How many of you agree with that?
116		Class	[*Camera shows students raising their hands.*]
117		RT1	Does anyone disagree?

118		Class	[*Camera shows students raising their hands.*]
119		RT1	Don't go away, Erik, what's the next question? Somebody disagrees. Andrew. Do you agree?
120		Andrew	No
121		RT1	Andrew disagrees. What do you disagree with?
122		Andrew	The one third approximately needs to be a little more over because the one fourth has to be half of the one half. So, if you put one fourth half of that [*placement of one third*] it would be on the left of the one third.
123		Erik	I know. I didn't, I didn't put the one third. The one third, if it was one fourth it probably be about here right. So it's not, it's just approximate cause I don't think
124		RT1	Okay, Do you want to call on Andrew to put in the one quarter? Now do you agree with all this Andrew?
125		Andrew	[*Laughs. Walks up to OHP in front of the room. Places a one fourth to left of one third.*]
126		Andrew	Yeah. Should I call on someone to place one fifth?
127		RT1	Okay. How many of you agree with what's up there?
128		Class	[*Several students raise their hands.*]
129		RT1	Does Anyone disagree? [*No students raise hand*]
130		RT1	Okay. What about the one fifth? Want to call on someone? Brian.
131		Brian	[*Walks up to OHP in front of the room and places one fifth to left of one fourth*.]
132		RT1	How many agree with that?
133		Class	[*A few students raise their hands.*]
134		RT1	Now suppose I asked you to put one tenth up there. Where do you think it would go? Think about it for a minute and tell me where you think it would go. One tenth. Beth, is your hand up or you just thinking? [*Beth remains quiet*] Where to put one tenth. What do you think?

135		RT1	Any ideas? Erin? Mark?
136		Mark	[*Walks up to the OHP and writes one tenth to the left of one fifth*]
137		RT1	Ok I'm going to ask you all one one-hundredth…What do you think?.
138		Erik	I disagree.
139		RT1	Erik, disagree? James? It's getting hard. Brian? I know this is getting hard right?. Jakki, you disagree? Why?
140		Jacquelyn	Well, if one fifth is next to the end. Then five plus five equals up to ten, so it would be like in the half.
141		RT1	OH Jakki thinks one tenth should go in the middle.
142		Students	[*mumble no*]
143		RT1	You disagree. James?
144		James	I think it should go more towards zero.
145		Students	[*mumbles yeah*]
146		RT1	More towards zero?..David? Alan?
147		Alan	I think that the one tenth should be moved over just a tiny bit.
148		RT1	It's getting hard to do this, isn't it?
149		Alan	Yeah, Up there you have a whole, you are dividing it into tenths and you have a half mark. So you have to use this as a guideline, you'd have five tenths on one side and five tenths on the other side. Now, up there, if you took that little space between the zero and the one fifth, and you use that five times it wouldn't reach the half way mark.
150		Mark	[*Inaudible gesturing on number line*]
151		RT1	What do you think? Brian?
152		Brian	I agree with Mark. It is a little far back. I think the third should be moved up, then the fourth should be moved up. Because that why I thought the fifth was wrong when I did it because everything was moved back.
153		RT1	Know what I would like you to do? Maybe the problem is there isn't a lot of space; when you use

			the overhead pen it takes a lot of space. I would like you all to make your own number line between zero and one at your seats. I would like to see if you could place fractions between zero and one. I'd like you to place all the fractions, one half, one third, one fourth, one fifth, one sixth, one seventh, one eighth, one ninth and one tenth, with your partner. Jakki?
154		Jacquelyn	[*Whispers to RT1*]
155	33:57	RT1	Sure. You can put your papers the long way if you'd like. No problem.
156	34:35	Andrew, Jessica	[*Camera focuses on Erik and Michael*.]
157		Andrew	[*Camera focuses on David and partner*.]
158	36:10	Erik	[*Off camera*] one one-thousandth would be at the window already.
159	36:12	RT1	[*Off camera*] Would it be? That's a very good question, Erik. Would one one-thousandth be somewhere on this line or somewhere near the window? ..but if you had a microscope that you could get it on would it end up being on the line or near the window?
160		Erik	[*Off camera*] Actually what you would have to make the line bigger.
161		RT1	[*Off camera*] Would it still be on the line?
162	36:39	Erik	[*Off camera*] Probably not.
163		RT	[*Camera focus on students in front of Michael/Erik.*] What are you doing here?
164	38:30	Michael, Erik	We're trying to make it exact.. were trying to make..instead of making it like that were trying to make it.. It may not be exact, but they will be a little more approximate. [*Michael talks about dividing up line.*]
165	39:40		[*Michael and Erik use a ruler to measure where the numbers will go.*]
166	39:50	Meredith	[*Counts out 5 spaces on line.*]
166	40:10	Brian	I think I know where the hundredths would go. Look, Because zero, five, ten, fifteen, 15 would

			go in there [*motions towards space near the 0*]. 100 would go in there [*motions towards space near the 0 past the 1/15*], 1000 would go in there [*motions towards space near the 0 past 1/100*]. Uhh,It's like a pattern…one two three four five..it's like a pattern though
167	42:03	RT1, RT3	[*Off camera discuss having Alan present.*]
168	42:44	RT1 to Class	Okay. If you're done and waiting for the rest of the people to finish, could you also mark on your line where three –fourths would be?
169		RT2	How does that work?
170		Andrew	Well, you see, it does not matter because I just did it on both sides so that it this doesn't like work.
171		Jessica	Yeah, that is what I did, I did it on both sides.
172		Andrew	You could go by that way [*motions from the right*]
173		Andrew	Or you could go by that way [*motions from the left*]
174		RT2	Oh, I see. Okay. So you just sort have done it a mirror image both ways
175		Andrew	Yeah
176		Jessica	Yeah, you could just you could just do it like that
177	43:34	RT2	So if I fold it in half, then I would have enough information to talk with. I see.
178		Jessica	Yeah.
179		Andrew	[*Follows Jessica and folds paper*]
180		RT2	Okay. That is interesting. I see you put one one-hundredth right there
181		Kimberly	I need help with the one one-thousandth.[speaking to Alan]
182		Alan	(inaudible gesturing on his zoomed in number line showing one one-thousand)
183	46:10	Brian, Meredith	Well it just has to be approximate it doesn't have to be exact. It has to be approximate…I did it

			right look. It doesn't have to be exact she just said approximate.
184	47:40	RT1	[*Speaking to Brian*] You have to mark zero and mark one. I can understand why this could be one third, but I don't understand how this could be one fourth. The numbers are supposed to be getting bigger, but you are making them smaller.
185		Brain	Oh, I'm getting confused somewhere between zero and one.
186	48:10	RT1	I know. Do you want to think about that?
187	49:30	RT1	[*To Mark.*] Do you want to label zero and one on here.
188		Mark	[*places 0 & 1 on line*]
189		Mark's Partner	[*Has ruler out measuring*]
190	50:30	RT1	[*To Class*] Okay so Are you ready Alan? Are we just about ready to discuss? How many of you are about ready to discuss? Okay almost four of you are ready to discuss. Maybe in a minute we will wrap up and have some good discussion. [*Alan raises his hand.*]
191	53:00	RT1	I would like to um ask you to um sort of stop placing your very careful placement of numbers. And I know you have not all finished, but I would like to spend the last few minutes in discussion and bring your attention to a few things I've noticed. I know it's hard when you are in the middle of something to stop. [*Places transparency on OHP.*]
192	53:53	RT1	How many of you have ever used a number line before?
193		RT1	Have you placed numbers on the number line before?

194		RT1	How about putting whole number on the line. If that were zero and this were a one.
195		RT1	Where would I put two? You know where I would put two? David?
196	54:10	David	Ohm. Over there. [*RT1 draws line from 0 to 2 with a continuing arrow.*]
197		RT1	Over there? About where, over here somewhere.
198		David	Yeah
199		RT1	Where would I put three?
200		David	Further over.
201		RT1	Do you know where you would put four and five? Do you all see that? How many of you have done that before? You made a number line and placed the numbers on the line?
202	54:40	Class	[*Many students in camera view raise their hands.*]
203		RT1	You could imagine that number line? You could mark zero, one, two, three, and four? Where would you put a thousand? Where would a thousand be on that number line? Can you imagine that? How many of you can imagine where a thousand would be? Would it be in the building?
204		Class	[*mumbles no*]
205		RT1	Would it be outside the building?
206		Class	[*Giggles yes*]
207		Alan	You'd be all the way to Pittsburg, Pennsylvania.
208	55:12	RT1	You think that far huh. So you remember how to do those number lines, right? Okay. I bet when you did number lines before you didn't place numbers between zero and one, did you?
209		Class	[*mumbles no*]
210		RT1	Is that right? You didn't place numbers between zero and one when you made your whole number line. Do you see the difference in what we are doing now? Now we are sort of looking at other pieces of the number line. Now Alan is going to

			share with us his piece of the number line between zero and one. He is going to talk about it so I would like for you to listen. Because I see some interesting questions out of here. [*Alan walks up to the OHP in the front of the room.*]
211	55:46	Alan	Now about the 1/100. I think.
212		RT1	Let's talk about the other ones first.
213		Alan	Well, between zero and one you can divide it into those fractions. Three fourths would go there [*motions to half way between ½ and 1*] because you would have the one third there, and then you would place one fourth there. And, it would take three of those [*motions to 1/4*] to get up to that mark. The one half you could use as guideline. The others, one tenth, one one-hundredth, and one one-thousandth.
214		Alan	Now I made another [*points to an enlarged portion of the top number line*] because you couldn't really see it on the other [*top number line*] That is where the one thousandth would go. You couldn't really make anything bigger than that because it would be too hard to see.
215		RT1	Leave that up there, Alan. I want you to stay up there for a minute. (inaudible) Some people made their number line where they took one third and they had one third to the right of where you placed one half. How many of you have that on your number line where you have one third to the right of one half?
216		Class	[*Some students raise their hands.*]
217	57:00	RT1	I'd like to have a discussion because enough of you did that and enough of you didn't do that and we had some differences and I'd like to discuss. Some of you put one third in two places. Do you all know what I am saying? Some of you had the one third where Alan has it and some of you also

			put one third on the other side of one half. What do you think about that? Alan?
218	57:30	Alan	You could put basically the one third in any place, in any three places of that number line because you could have the third going either way. I mean, you could take it out from there, you could take it out from there, or you could take it out from there. It really doesn't matter. So you really could put it in three different places.
219		RT1	Do you all agree? So where would a second place for that one third be?
220		Alan	The second place for that one third would be ..it would be somewhere it would be up here approximately [*points to the right of one half]*
221		RT1	Where would you put two thirds?
222	58:28	Alan	Two thirds would go right there [*motions to same location of where said a 1/3 would go.*]
223		Alan	Because, if you have thirds you would be dividing that into three parts so you could put it in three different places.
224		RT1	Well I'm not clear. So you are saying you could put one third in the second place. And you're saying..where..How are you comparing the places where you put the second one third and the two thirds?
225		Alan	Well If you use the rods to sort of bracket like this.
226		RT1	Let's do that.
227		Alan	Here youd have thirds. [*Puts rods on OHP – 1 green and 3 reds*]
228		RT1	Okay so let me just sketch this if you don't mind.So im going to do something like this right? This is going to be my number line right? This is going to be my zero this is going to be my one okay so here ..is that okay?[*marks 0 and 1 on OHP along the green rod. and marks the lengths from the three red rods.*] I'm asking you to mark

			one third; but, remember where I marked zero and one with respect to where I marked my zero and one.
229	59:26	Alan	You could mark the one third here [*first tick mark*]
230		Alan	or you could mark it between here [*second tick mark*]
231		Alan	or you could mark it here [*on top of the 1*]
232		RT1	So place the number one third on that number line.
233		Alan	Well The number one third would go up here because... [*first tick mark*]
234		RT1	Okay. Let's stop for a minute. How many of you agree that one third goes up there? See we have the zero and one how many of you would place the one third there , where Alan is placing it?
235		RT5	Move to side, honey so we can see.
236		RT1	See what he did? He took the green rod right, and is calling it one and he took the three red rods and he marked off the spot at the end of the red rod he put a one third. Do you all see that? How many of you agree with that? He put the one third above?
237		RT5	That that Is a third? Is it or isn't it?

238		Class	[*Many students in view raise their hands.*]
239	1:00:37	RT1	How many of you believe it is a third? How any of you believe it is something else?
240		Class	[*Few students in view raise their hands.*]
241		RT1	This is my next question; it's an important question. Alan is saying, and some of you are saying, that where I also have that other little mark I can also put one third. I'm asking you then how than/where would I mark two thirds? That's my question to you. Where would I put two thirds? I guess I get a little confused when you tell me they are both one third. I'm kind of wondering what you are thinking.
242	1:01:11	Mark	[*Walks up to OHP in front of the room.*] Well, I would put it..right there [*puts it over 2nd tick mark*]
243		RT1	Mark would put it there. How many of you would put two thirds there also? [*Off camera*] You all would do that. Where would you put three thirds? Danielle, you want to come put three thirds somewhere?
244		Danielle	[*Walks up to OHP in front of the room. OFF CRT2ERA. Places 3/3 above the third tick mark or 1*]
245		RT1	Where would you put zero thirds? Andrew? Stay there Alan. I'm not finished. I want you to talk about your (inaudible word) alittle bit more.
246		Andrew	[*Walks up to OHP in front of the room. OFF CRT2ERA. Places 0/3 above the first tick mar, or0*]
247	1:02:06	RT1	Okay. Zero thirds, one thirds, two thirds, three thirds or zero, one third, two thirds, one. Do you agree with that? Does that make sense? Is it okay to put one third where you have two thirds if that is your number line and not rods anymore?

248	1:02:29	Alan	Well, basically, what you can do is this space could be one third, and between here and here that space could be one third.
249		RT1	That's true. I believe that. You proved it when you put the red rods there.
250		Alan	Basically, what comes to mind when you think about fractions is that you cannot always think about the first one
251		Alan	because you could put it here [*motions to first space*],
252		Alan	here [*motions to second space*]
253		Alan	or here [*motions to third space*]
254			and it would still be one third. But, you could put one third,
255			two thirds,
256			or three thirds.
257		Alan	You could put it in any one of those places but you could still go one third [*motions to first place*], two thirds I mean one third
258		Alan	That would be one third [*motions to 2nd place*]
259		Alan	That would be one third [*motions to third space*].
260	1:03:21	RT1	Does that really work? I'm curious? Andrew?
261		Andrew	I don't think it would work because if you just put red in the middle and call that one third, then if you put on the left side of it three thirds then on the right side of it two thirds then you would be reading it umm two thirds, one third, three thirds. So, ohm, where ever you put it in that space, you always have to start from zero because you cannot go from one down to zero because that [is when you stay there] because if you start it like

			that then you are just switching the zero and one.
262		Alan	Right. It's true you can put one third in anyone of these places but basically what comes to mind once you think of fractions is that you always think of the first one it could go in anyone of these.
263	1:04:25	RT1	So you are saying the length of all of those rods happen to all be one third. Is that what you are telling me? The length of all of those rods are all one third and you are marking off the rods the lengths of one third, right?
264		Alan	Yeah
265		RT1	But, when you mark off the rods, you mark off where you place the numbers, is it okay then to make all those numbers equal to one third?
266		Alan	Yeah. You could put that there it would be equal to one third.
267		RT1	Yeah. That length is equal to one third but when you place your numbers on the number line can you write them all as one third?
268		Alan	No. You can put that in the beginning on the number line; but, when you think of fractions you can put it in anyone of these places as long as like you are not basically trying to divide another put another rod in there like this [*view blocked as Alan wrote on OHP*]
269		Alan	then you would have to put something through there. But, you could put the third in any one of those but it doesn't because they are all the same length each so they still have the same fraction value of one third.
270		RT1	It is sort of like you are making a ruler. Andrew?
271	1:05:24	Andrew	Yeah, but if you are doing that you see, if you put it in the middle, right, then the one on the left is blank so they would think it needs to be filled in so they would fill it in and it would be two thirds because they mostly have spaces because you take zero to one hundred. You can't go one third would be next to one hundred it would be three thirds next to one hundred because if you divide

			zero to one hundred into thirds you can't go from one third. Then, by the zero it would be three thirds.
272		RT1	Let me ask you a question. If I were making a rule with whole numbers and I decided that I was going to mark off inches, right? Would it be Okay on my ruler, once I decided an inch, you know what an inch is, like that would be one third? Is it Okay to say when I make my marking, Okay this is one and I mark another one and say this is one again and I mark my ruler again and say this is one and mark my ruler again and say this is one. So it's true, they are all one inches in length aren't they, but would that be an Okay way to make a ruler? Would that be helpful? Why not?
273	1:06:57	Sarah	It's not the way to put… A ruler has the different numbers that you count by so if you have all these 1s and you don't have the numbers that they belong to, then….
274		RT1	Well, Alan, would argue, I think, maybe not, that this is one inch and this is the same length one inch and this is the same length one inch, so why can't we mark these all one?
275		Alan	They are the same length, but you could take three more of these.
276		RT1	How do I mark my ruler? I'm making a ruler here for fractions?
277	1:07:44	Alan	Right, but if you say you wanted to divide it. Because a ruler shows you how long something is like up here [*points to OHP*] the red is one inch, one inch,
278		Alan	and if you add another one inch on there then that would be two inches
279		Alan	and you add another inch on there it would be

			three inches.
280		RT1	So what would I mark where the one inch ended? What number would I give it? What number would I put here if I were making a number line or ruler?
281		Alan	You'd put one there [*put first red rod down*],
282		Alan	Two there [*puts second red rod down*]
283		Alan	and three there [*puts third red rod down*]
284		Alan	because that would be one inch and that would be two inches and that would be three inches.
285		RT1	And of course it agrees with what you said each of these are an inch in length. David you were going to say something?
286	1:08:17	David	Well, I was just going to say that ohm, they may be all the same thing but when you're measuring something then you know that if it is an inch you know how many instead of just counting all of them.
287		RT1	I know our time is up and this is a really good discussion. Alan, thank you, I may want you to talk about your other one a little bit more tomorrow. [*to class*] I'd like you to think about the little number line you made, the fraction number line between zero and one. I want you to hand in the one you have, but I want you to make me another one, Okay? I'd like to see what you can do between zero and two for homework? See what fractions you know and what whole numbers you know between zero and two. Okay? Is that Okay Mrs. Phillips?
288	1:09:15	RT5	That's fine. Take out your assignment pad.