

Description: Placing fractions and mixed numbers on the number line Parent Tape: Infinite Number Line Date: 1993-10-11 Location: Colts Neck Elementary School Researcher: Professor Carolyn Maher	Transcriber(s): Schmeelk, Suzanna Verifier(s): Cann, Matthew Date Transcribed: Spring 2009 Page: 1 of 6
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1.		RT1	Is the placement of some fractions. I would like everyone to take a turn up here to place some fraction on this number line. And maybe I will ask Gregory to go first [Gregory walks up to overhead.] because you were so quite and didn't get a chance to say anything. Could you place a number for us between zero and two. Would you please do that for us? Everyone is going to get a turn so you might think about a number you are going to place between zero and two. Any fraction you want between zero and two—just tell us why you are doing it and you have to get the class to agree that that is a reasonable place. So you all are watching and you all are going to get a turn so someone is going to be watching what you place there and you are going to be watching what other people place so think of the number you are going to place.
2.		Gregory	[off camera]
3.		RT1	You all can be thinking about the number you are going to place. Someone else may take your, you know, so you better have a couple of back up numbers. Right? Remember we have infinitely many to chose from; so, we are not going to run out of numbers are we?
4.		Students	[off camera]
5.		RT1	Okay. What do you think about that? Jessica?
6.		Jessica	I think that, well, are you doing it between zero and two?
7.		RT1	I think you are doing it between zero and one ...
8.		Jessica	That is not half
9.		RT1	How could you change it a little bit? It is hard up there to see isn't it Gregory? Which way would you move it? Closer to zero or closer to one?
10.		Jessica	You could use the ruler.
11.		RT1	Why don't you offer that [points to ruler] to Gregory to line it up. [Jessica takes ruler up to Gregory] You all may not agree. Could you move it towards the negative just a tiny bit? We need paper towels... [off camera] Are you all a little happier now with where Gregory placed one half? What do you think? I know this is a difficult job. I have an idea. I was going to ask Mrs. Phillips if next week, I thought a wonderful activity for the class would be to do it on the board—a big number line. And, put it on the board and each of you have a chance to place it and, then, it would be easier for you to check it out and measure it. And, place let's say numbers between zero and three or negative one and two or negative two and two and see what you would come up with?
12.		Students	Now you need to move it more over towards the one.
13.		RT1	[laughs] Now you need to move it a little bit more over to the one. How about not doing it exact, okay? You could do it more exact on the board.
14.		Students	Do it in the middle. Yeah.
15.		RT1	You all like that? Yay. Let's give everyone a hand because that was very nice. Okay. That one is very important because it affects what everyone else does. We appreciate that. Okay. Alright. [All the students on camera raise their hand.] Lauren? [mumbles that may be disappointment from others not selected]
16.		Laura	[Walks up to overhead.]
17.		RT1	I wonder what Laura is going to pick. What do you think?
18.		Students	I don't know.
19.		Laura	[off camera.]
20.		RT1	What do you think? How many of you like where Laura places one-quarter?
21.		Students	No
22.		RT1	What don't you like?
23.		A student	[Off camera] Is she doing it between zero and one or zero and two?
24.		RT1	Should it matter? Does it matter?
25.		Students	No.
26.		Brian	You should put it on the half if it is going to be zero to two.
27.		Alan	Yeah, you could divide all the zero to one into all those fractions or you could divide the zero to two into all those fractions.
28.		RT1	Laura wanted it right there between zero and one half she did not want to put it between ... You want to put it where one is? We have one there. You want to put it where one half is? We have one half there. Can one half and one quarter go in the same spot?
29.		Andrew	Where the one half is; If you are going to two, it can because if zero and two the half of it is one and usually the fourths are a half of a half so the half that you put there would be the fourth
30.		RT1	Okay. So let's hear from Laura. She was doing it doing it from zero to one; but, even so this is a very important point you make. Thank you very much Laura.

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31.		Students	It looks like a third. [off camera]
32.		RT1	Is that better? I still want to discuss it. Even if she is going between zero and two, I want to know if she were going between zero and two, should one-quarter go someplace else or not? In other words, my question to you: on this number line, and remember this number line goes on and on without ending, how many places is there for each fraction? Can a fraction have more than one place?
33.		Students	Yeah.
34.		Michael	Three quarters is on the other side of the half.
35.		RT1	I'm very confused. I'm very confused. I want to go back to the comment Andrew had and the question some of you had that you didn't like the way Laura placed one quarter. Laura placed one quarter between zero and a half. That tells me something about a quarter. But, some of you seem to think it could go somewhere else; and, I'm very confused.
36.		Michael	It could stay there or it could also go somewhere else if you double it or multiply it or ...
37.		RT1	No, I'm talking about the number one-quarter. Erik?
38.		Erik	The one-quarter should be moved over towards the zero more ...
39.		Meredith	I know because you need to fit one-third on the other side... It looks like a third.
40.		RT1	What do you think, Laura? Do you want to move it over a little bit more? It's a difficult issue. Move it over a tiny bit more? Would you agree to that? I think Laura has conceded to move it over a little bit. That is not my question. I know this is approximate and it is really important that we set some of these up right at the beginning, isn't it, otherwise it affects the other ones you are thinking of; but, that is not my question. My question is on that number line where we said there were infinitely many points, the point that has the number named a quarter could there be a different point with the number named a quarter? That is my question. On that number line with infinitely many points. That's the big question.
41.		Meredith	There could be; but, you would have to add more numbers.
42.		RT1	That is one and one-quarter. I'm talking about one-quarter, Meredith.
43.		Alan	There would be infinite places for one-fourth because if you enlarged the space between two points you could divide that into one-fourths.
44.		RT1	Alan, that is not what I am saying. I'm not saying divide the line.
45.		Alan	Well, you could also put the one fourth on the one half and that could be
46.		Erik	No you can't that's an improper fraction. There are fourths for each whole. If you are dealing with two wholes then that would have to be eight fourths. Yes, there have to. You can't have a one fourth for two wholes.
47.		Brian	But, those two wholes can make one whole.
48.		Erik	No, they don't. There are two wholes separate.
49.		Alan	No. The zero to the two is what we are talking about. The one is what you were doing the zero to the one. The one is the half for the zero and the two.
50.		Brian	I agree with Alan because those two wholes put together make one whole so you would put the fourth on the half between the zero and the one.
51.		Erik	I know, but Brian, Brian, Brian, [walks up to overhead]. If you say that you are supposed to have two-fourths here and two-fourths there and then you divide this into two fourths. Then you are only going to divide this into halves.
52.		Students	[Erik, Brian, and Alan continue arguing]
53.		Alan	You are talking about having them separate, but we are not we are talking about having them together.
54.		Erik	I know, but I'm saying that you think we should have fourths and they should be four-fourths. And, you think that they are one whole together.
55.		RT1	Okay. Time out for a minute. Time out and then I'll hear from other people. I think I'm confused. Is anyone else here confused? [at least five students in the camera view raise their hands] I have a question because I'm confused. Mrs. Phillips is confused. Dr. Martino is confused. So, we want to straighten-out our confusion. Let's stop for a minute. Hold on. I want you to think for a minute. There are some things about this ruler that are like a number line. There are some things about this ruler that are not like a number line.[off camera] Okay?
56.		RT1	And if something about this ruler that is like your Cuisenaire Rods and there is something about this ruler that is not like your Cuisenaire Rods. And what we have to get in our heads what are we talking about because we are arguing thinking about something different. And, unless we are agreeing about the same thing then we are going to keep arguing past each other, you know?

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57.		Students	Hum-huh [affirmative]
58.		RT1	So let's establish a few things to make sure we are in agreement about what we are talking about. There is a number line, that I have there, on the board. Does it end or does it go on and on?
59.	52:50	Students	On and on.
60.		RT1	How many of you agree that it goes on and on?
61.		Students	[8 students on camera raise their hand]
62.		RT1	The ruler that I am holding in my hand. Does it end or does it go on and on?
63.		Students	Ends.
64.		RT1	It is a segment. It ends. Okay. The Cuisenaire rods that you build, does it end or does it go on and on?
65.		Students	It ends.
66.		RT1	It ends. Now, we have some agreement. That is a start. Yes, Jessica?
67.		Jessica	It goes on and on if you could build a model.
68.		RT1	Yeah, but right now, these models whether they are the Cuisenaire Rods or the ruler, what mathematicians do is they take some idea and they build a model of the idea. That is what they do. They build models. That is what they do for a living. Mathematicians build models to describe some things they are trying to describe. Now, the number line that goes on and on without stopping forever and ever, could we build such a model?
69.		Students	[Mumbles]
70.		RT1	That's the idea, right? We can only look at a piece of it and build.
71.		Michael	[Inaudible]
72.		RT1	Okay. Now. This is my question to you. Once I start taking a piece of a line, right, what Andrew said earlier, Andrew. Is he talked about, well, I could say here is a half, right in the middle, right?
73.		Students	Yeah. [Quietly]
74.		RT1	And what he is now doing is what he is doing is he is now taking the half of the length of this particular ruler, right? But, if you look at the ruler, you don't see in the middle here one half, do you?
75.		Students	No.
76.		Michael	You see a six.
77.	54:30	RT1	You see a six. [Loud speaker interrupts asking for Jakki.] Okay. If you were thinking about Cuisenaire rods in a certain way you might, if you were calling that Cuisenaire rod one, then you would give this a number named one half, wouldn't you? If you were calling that Cuisenaire rod twelve, then you would call it a six rod, right? Isn't that true?
78.		Students	Yeah. [Quietly]
79.		RT1	You agree to that, right?
80.		Students	Ohm-hum. [Affirmative]
81.		RT1	Okay. Now what is tricky here is that this line goes on and on without ending, right? So maybe what helps is to think about pieces of it.
82.		Students	Yeah. Pieces.
83.		RT1	Like the piece between zero and one, but once I call this one you can't change it's name because I've already given it the number name one. Do you understand?
84.		Students	[At least two students nod head up and down]
85.		RT1	And now I'm talking about the next piece if you want. We can talk about pieces of it, but try not to get it confused with the ruler and the rods. Try to think that once I put a number name on a particular point that will always be that number name. Okay? The question is where to do you fit the other fractions and how do you give them number names?

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86.		Erik	Dr. Maher, what I think is since Alan says you should have two fourths here [off camera] and two fourths here [off camera] but each time you have a whole you have to have four fourths for each whole.
87.		RT1	Yeah, but what I want to say to you here is that if you want to put two fourths here [off camera] Is it two fourths if you are reading your ruler?
88.		Erik	No, it's one half.
89.		RT1	Is it one half?
90.		A Student	[inaudible]
91.		RT1	Over here, [off camera 2] If you wanted to put two fourths. If you are talking the distance half way between one and two, that is what you are telling me to do, right?
92.	56:17	Students	[inaudible]
93.		Erik	That is one and one half.
94.		RT1	That would have what number name, Erik?
95.		Erik	One and one half.
96.		RT1	One and one half
97.		Erik	It wouldn't be fourths.
98.		Brian	If you put those two wholes together so then it makes one whole.
99.		RT1	We are not dealing with rods now, we are dealing with the number line, Brian.
100.		Erik	And if you think that two wholes have to have four fourths each you are wrong because each whole has to have four fourths to one whole. If you divide one whole into fourths they have to have four of them to be one whole.
101.		RT1	Well, let's go back. I don't want to miss an important point Erik said. Let's look at this again, Andrew. Between one and two, right, you know that half way is in the middle, right? Now, if I have to give it a number name, can you give this a number name a half when it is to the right of one?
102.		Erik	No. You have to call is three fourths.
103.		Alan	You would have to call it one and one half.
104.		RT1	Some of you think we need to call it three fourths and some of you think you need to call it one and one half Well, this is a good place to stop. We have so much to think about. Don't we? David?
105.		David	On my paper I did, ohm, I thought about that. I put one and one half there [off camera]
106.		RT1	You put one and one half here?
107.		David	Yeah.
108.		RT1	Where would you put one and three quarters?
109.		Michael	You would probably push it a little to the right of one and one half.
110.		RT1	How much to the right of the one and one half would you put it?
111.		Michael	Like, that much [holds up to fingers to show.]
112.		RT1	Can anyone give me a number name for how much to the right, Meredith? Of one and one half you would put one and three quarters? Jessica?
113.		Jessica	One and one half. No. I mean [chuckles]
114.		RT1	One and three-quarters. If I put one-half here, some of you are telling me that one and three fourths would have to go somewhere in here.[off camera]. To the right of this [off camera].
115.		Jessica	Yeah, it would probably go in the middle of that. Well, ...
116.		RT1	Okay. Some of you said it would go in the middle. Why did you think middle, Jessica?
117.		Jessica	Because, well, if you had one and one fourth?
118.		RT1	One and three fourths.
119.		Jessica	Yeah, because, well, I'm not sure.
120.		RT1	Something to think about. Meredith?
121.		Meredith	Well, if you have two, two-fourths, that would be say one and one fourth... one and one half
122.		RT1	I'm not sure I understand what you are saying.

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123.		Meredith	Well, see if you [walks up to overhead].
124.		RT1	If you keep adding fourths you are telling me?
125.		Meredith	If you have two-fourths, [off camera] it is equal to one and one half. So, then, you would have two more fourths [off camera] would equal another half which would equal a whole.
126.		RT1	So you are telling me this is one and one half, right? [draws on OHP]
127.		Meredith	Yeah.
128.		RT1	So you are telling me that if I want another fourth, what would that be? [draws the numbers on the line.]
129.		Meredith	One and three fourths.
130.		RT1	You are telling me that would be one and three fourths?
131.		Meredith	Yeah.
132.		Andrew	Yeah, that's it.
133.		RT1	You would agree with that Michael?
134.		Michael	[inaudible]
135.		RT1	You would agree with that Andrew?
136.		Andrew	[Off camera]
137.		RT1	Jessica that is what you were saying?
138.		Jessica	[Off camera]
139.		Michael	I also I think it would be a fourth because like in a half is two fourths and in that half it should take two fourths. It does if you divide the half in half.
140.		RT1	Okay.
141.		Andrew	We are calling that a half because anything past the line is one and whatever.
142.		RT1	You get the idea. What you are thinking about is the lengths of those parts that are enabling you to mark the number but don't confuse that with the new number name. You got to look about where it is on that line to give it a new number name. Do you understand what I am saying?
143.		Students	Ohm-huh [affirmative]
144.		RT1	But something to think about just by the way were would two and a half be?
145.		Alan	It would be behind the two.
146.		RT1	How many of you think you know where the two and one half would be?
147.		Student	Two and one half? [At least six students in camera view raise their hands.]
148.		RT1	How many think you know where you would put two and one half? Raise your hand if you think you know where two and one half would go? Two and one half. Two and one half.
149.		Students	[At least four students on camera raise hands.]
150.		RT1	Kelly?
151.		Kelly	In the middle of the one and the two. [stands up and points].A little bit past the two.
152.		RT1	Two. How much past the two?
153.		Kelly	Half.
154.		RT1	Half way?
155.		Kelly	Yeah.
156.		RT1	Half way? What do you mean by half? Half of what?
157.		Kelly	Half of that ruler.
158.		RT1	Half of that ruler because that ruler is going to be between about what, Amy?
159.		Amy	Two and three.
160.		RT1	Two and three. So where would you put two and one half?
161.		Student	Half of that ruler.
162.		RT1	Yeah.
163.		David	[inaudible]
164.		RT1	Isn't that interesting?
165.		Students	Yeah.
166.		RT1	You know what I would like you to do? I asked you to think of as many fractions. If you've done it already you don't have to do it again unless you have some new ideas or if your thinking is extended? I would like you to think about the numbers between zero and two and see if you can find number names for numbers in between if you've changed your mind about anything as a result of today's wonderful discussion. Wonderful discussion. I'm not going to see you guys for a while. You have a wonderful weekend. I'll see you next week ... at the end of next week. Thank you. What do you think, Erik?

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