

Description: Building Large Models to Show Equivalence: An Exploration (side view) Date: 1993-10-07 Location: Colts Neck Elementary School Researcher: Professor Carolyn Maher	Transcriber(s): Yankelewitz, Dina Verifier(s): Yedman, Madeline Date Transcribed: Spring 2009 Page: 1 of 24
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Line	Time	Speaker	Transcript
9.1.1	00:14:53		<p>T/R 1: Well, good morning! [students answer good morning]. I saw how hard you were working yesterday, I looked at tapes last night and early this morning, and I feel very close to you. You had breakfast with me this morning some of you, and you had, um, I guess, some dinner with me and one of my colleagues who was visiting, and it was really wonderful to watch the way you were solving those problems. Um, and I read your papers, so did Dr. Martino, and uh, I was so impressed at how hard you were all working and the wonderful wonderful thinking that you shared with me in the pictures you drew and the models you made. Yesterday I was working with a group of thirty teachers - that's why I couldn't be here - um, Mr. Purdy was there in the afternoon, he was here in the morning, and I was showing them some of your work and weren't they impressed?</p>
9.1.2		Purdy:	<p>They were very impressed.</p>
9.1.3		T/R 1:	<p>They were very impressed, and your teacher Mrs. Phillips knows some of these other teachers and they said "Oh my goodness, those students are doing such wonderful mathematics!" They were so pleased. So I'm glad to be here, today, I need to tell you, I'm going to be gone for a couple of weeks, um, we have to go to a conference in California, Dr. Martino and I, and uh, we're leaving next week. Dr. Martino will be here Monday, and then it will be two weeks before we come back. Um, so while we're gone, and the other mathematics you're doing with Mrs. Phillips, I hope you'll continue to write to me about what you're doing and to Dr. Martino, so, we sort of can still feel close to what's going on when we're not here. So would you do that [Students nod and say Mmm hmmm]? Would you be writing [CT says "Sure"] and then I, we won't be able to wait until we come back. Um, and then we'll be here for a little while again. Ok? Um, I was watching and reading and I was really interested in some of the questions that you were sort of thinking about as you were making your models and I noticed that everyone made a few models in the problems you were solving, isn't that right? You all were making a few models and I know I know Erik was making a model and he's worried about how he can get it on his paper, right? And, cuz it was a large one on his desk, and I'm kind of thinking, um, how are they gonna get it on the overhead when they share it with us, right? That's gonna be a problem. But I thought, you know, we can always</p>

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get a couple of pieces of paper and paste them together if you had to, that's ok. You know, you can fold them or something. So, we'll figure out ways to record even if some of your models do get bigger. Um, what I was going to ask you to think about, um, one of the problems a little bit before we even shared and that was the problem that I think everyone did work on, uh, the second one, which was larger, three quarters or [students say two thirds] two thirds. Did everyone here work on that problem? Somebody might have been ab- raise your hand if you worked on that problem. [All students shown raise their hands] Which is larger, three quarters or two thirds? Ok, and how many of you built more than one model to show a solutions to that problem? [a few students raise their hands]. How many of you built three models? [No hands are raised] Some of you built two models, were working on two models? Yes, I'm really interested in this. Um, do you remember anything about the problem? I know you don't have the rods yet, but I want you to try to imagine in your mind if you can remember what you did when you solved the problem, which is larger three quarters or two thirds? By the way, do you remember which was larger? [students say mmm hmm] You do remember [mmm hmmm, yeah]. How many of you remember which is larger? [some students raise their hands] Can you think about it in your minds, what you built? I'm kind of curious, what helps you remember, Sarah?

- 9.1.4 Sarah: Uh, that two thirds is larger
- 9.1.5 T/R 1: She remembers that two thirds is larger. [Erik: I remember something] Erik?
- 9.1.6 Erik: I remember that two, wait, three fourths is larger than two thirds by one twelfth or two twenty-fourths.
- 9.1.7 T/R 1: Erik remembers it differently. Anybody else? Anybody else remember it? You're not so sure? Michael, what do you remember?
- 9.1.8 8:42 Michael: I agree. I agree with Erik, um, because, that's, I remember three fourths being bigger than it because the four, wait I had three light greens and then only two purples and the three light greens were larger.
- 9.1.9 T/R 1: Hmm, it could be we need our rods. It's hard for me to remember these. You think that will help? [students say yes]. Ok. Could you give out these for me, Jackie to the tables? What are you thinking, Meredith, while we're giving these - Erik [inaudible] Alan. [Students distributes sets of Cuisenaire rods]. Meredith?
- 9.1.10 9:00 Student in Back Oh, I notice.

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- 9.1.11 Meredith: I remember the greens [holds a light green rod] were three fourths, the fourths and the purples [picks up a light green rod] were the um, thirds. And if you took a third, that's four, and two thirds are eight and you have three of these [light green rods] which are three, this is nine, and this is eight, so three fourths will be more.
- 9.1.12 T/R 1: You agree with that, David?
- 9.1.13 David: Yeah?
- 9.1.14 T/R 1: You remember that?
- 9.1.15 David: Yeah.
- 9.1.16 T/R 1: They don't have their matts on the table, um, [inaudible]
- See:
- 9.1.17 Voices: Why do you need to make that big thing?
- 9.1.18 Erik: The dark greens. Dark greens are the fourths.
- 9.1.19 Jackie: [Jackie has built a model of an orange and red train, four light green rods, and three purple rods. She also shows two purple rods next to a light green rod.] It wasn't.
- 9.1.20 T/R 1: You remember, Jackie?
- 9.1.21 Jackie: Two thirds, wait, two thirds and one fourth?
- 9.1.22 T/R 1: Three fourths
- 9.1.23 Jackie: Oh.
- 9.1.24 11:53 T/R 1: Two-Thirds and three-fourths.
- 9.1.25 11:56 T/R 1: Do you think this will work, Erin and Jackie?
- 9.1.26 Danielle: Jackie, what was the problem?
- 9.1.27 Jackie: Two thirds and four, three fourths, which is bigger?
- 9.1.28 T/R 1: [To Erik and Alan] I have a question for both of you. I've watched [inaudible] in the tapes for breakfast this morning, so I feel very close to your solution, Erik, and Alan, but I have another question. While you're building this, I'd like you to build the other model you also made.
- 9.1.29 Erik: That was
- 9.1.30 Alan: Oh, yeah, the two browns, remember?
- 9.1.31 Erik: Yeah
- 9.1.32 Alan: One brown, two, I think it was the two of those.
- 9.1.33 Erik: One of those
- 9.1.34 Alan: Yeah, one
- 9.1.35 Erik: Something like that.
- 9.1.36 T/R 1: Ok, I'd like you to build the other model, and then I want to ask you a question about your two models. Try to remember what
- 9.1.37 Alan: Yeah it was the two browns
- 9.1.38 T/R 1: Why do you think it was the two browns?

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- 9.1.39 Alan: Because two browns would be able to third it and fourth it. So, let's see. One,
- 9.1.40 Erik: Don't take any whites, though. I need all the whites possible.
- 9.1.41 Alan: I know.
- 9.1.42 T/R 1: We can get some more.
- 9.1.43 Erik: Plus there are probably no whites left in there.
- 9.1.44 Alan: Let's see,
- 9.1.45 Erik: There are two whites, don't take any of them. Now we know that there's twenty four...
- 9.1.46 T/R 1: Ok, build the other model and then when you're done, call me back
- 9.1.47 Alan: One th- uh,
- 9.1.48 Erik: One third
- 9.1.49 Alan: I need um,
- 9.1.50 Erik: Yeah, no
- 9.1.51 14:00 Alan: Give me two dark greens, no, three, make it three, um, blacks that might do it. Yeah, three blacks thirded this. Three
- 9.1.52 Erik: No, cuz blacks are bigger than dark greens.
- 9.1.53 Alan: Oh yeah, dark greens, get me three dark greens
- 9.1.54 Erik: No, dark greens don't work.
- 9.1.55 Alan: Those are two browns? Oh yeah. Oh, now I remember, it was a train of two browns and a red.
- 9.1.56 14:29 Erik: Yeah, that's what I remember - don't take a red, no, not from there! [Erik has built a model of an orange and red train, three purple rods, four light green rods, six red rods, and twelve white rods]. Greg, can you spare us some
- 9.1.57 Alan: I'll just take it.
- 9.1.58 Erik: Ok. Here, so brown, two browns, a red, and yellows were the thirds, I think.
- 9.1.59 Alan: No, fourths.
- 9.1.60 Erik: No.
- 9.1.61 14:55 Alan: Purples were the, no, dark greens thirded it.
- 9.1.62 Erik: Could you spare us three, uh, three dark greens, Greg? We need-
- 9.1.63 Alan: I can't get any rods these days. We low on supplies. Oh great.
- 9.1.64 Erik: There's nothing left in the boxes, there's like absolutely nothing in the boxes!
- 9.1.65 Alan: There are none up there.
- 9.1.66 Erik: Oh, there's another dark green.
- 9.1.67 Alan: Oh, good good good
- 9.1.68 Erik: We need two.
- 9.1.69 Alan: Uh, I think that might do.

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- 9.1.70 Erik: I don't know. Where's the half?
- 9.1.71 Alan: [mimicking] I don't know.
- 9.1.72 T/R 1: There may be some more boxes in the back.
- 9.1.73 Erik: More boxes in the back?
- 9.1.74 15:48 Brian: Five, fifths.
- 9.1.75 Michael: I want to make another model
- 9.1.76 T/R 1: There were some bags.
- 9.1.77 Michael: Ok, let's try the blues [student in background: I got it!] Three, one two,
- 9.1.78 Brian: I can't think of one!
- 9.1.79 Michael: This is hard.
- 9.1.80 Brian: This is hard, I can't think of any.
- 9.1.81 Michael: I found one, I think. [Michael builds a model of a blue rod and three light green rods.] There's thirds, now I need fourths, so that should be red [Michael lines four reds up against his model, but that train is shorter than the others]. No..
- 9.1.82 16:19 Michael I thought four this.
- 9.1.83 16:30 T/R 1: Did you do it another way, Brandy. Three-quarters and two-thirds
Three-quarters and two-thirds.
- 9.1.84 Brian: Oh, I have one,
- 9.1.85 Michael: One went under the desk. Nope we used up all our dark greens.
- 9.1.86 David: This one.
- 9.1.87 Michael: Ok.
- 9.1.88 Brian: I have it, wait! Wait!
- 9.1.89 Michael: Make it one shorter - make it the next size down - black - make it black. Here, I'll give you some.
- 9.1.90 Brian: No, it's not going to be thirds.
- 9.1.91 CT: Gents, when you start to write, you know, what problem are you doing?
- 9.1.92 Michael: Um, we're doing, we're doing, which is larger three fourths or two thirds?
- 9.1.93 CT: Ok, make sure when you start to write that you have your name down and your problem.
- 9.1.94 17:31 Brian: I only started doing this yesterday. Can I do it over? I did.
- 9.1.95 T/R 1: Can I make a suggestion, gentlemen?
- 9.1.96 Erik: uh huh. I think it was one brown rod and red.
- 9.1.97 18:17 T/R 1: My suggestion is, you have the answer to your question if you carefully study what you built here. If you carefully study this, and study what you did here, you may have the answer to it. If you think

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- about how you built your one here, that should help you, just think about it. [turns attention to another student] Yes, sir?
- 9.1.98 Alan: Hold it
- 9.1.99 Erik: [makes noise]
- 9.1.100 Alan: There. Subtract two from each of those things. What would you get? Two from the purple would be a red, two from an orange would be a blue, two from a brown, would be a - right! So two browns and a red must be the answer, right?
- 9.1.101 Erik: No.
- 9.1.102 Alan: Oh.
- 9.1.103 Erik: Just try one brown
- 9.1.104 Alan: One brown.
- 9.1.105 18:52 Erik: Let's see what does it. Sorry.
- 9.1.106 Alan: Oh, wait, wait, wait, wait!
- 9.1.107 19:15 Erik: Light greens, you take a part [inaudible]. No, it's one brown and a red. The puples wouldn't make a third. Wait.
- 9.1.108 19:21 Alan: Fourths, maybe we could try a red? It's a brown. Four blacks. Yeah, exactly!
- 9.1.109 Erik: Ok. Didn't we have, we need, wait, maybe is was two browns and a red. Two browns and a red, wait then two from a brown would be a black, wouldn't it? No
- 9.1.110 Alan: No, dark green, d.g.
- 9.1.111 Erik: Wait, yeah, wait
- 9.1.112 Alan: Yeah, dark green, get me three dark greens. Alright
- 9.1.113 Erik: We did this already now what's the fourths? Ok, fourths there are dark greens, two from the dark greens would be a, a
- 9.1.114 Alan: A light
- 9.1.115 Erik: Purple
- 9.1.116 20:37 Alan: Purple would fourth this. You see? One, two, three, four. I already know that one. I already know it's the same. Look.
- 9.1.117 Erik: And it's the same, and it's gotta be a - the light green's smaller,
- 9.1.118 Alan: Hold it, look at this. Two browns, which would equal up to ten, wouldn't it?
- 9.1.119 Erik: No.
- 9.1.120 Alan: Yes, two down from the brown
- 9.1.121 Erik: Is bigger.
- 9.1.122 21:09 T/R 1: Can you tell me, I want you to think real hard about it, if you look at the models, do you see any relationships among them, or between them? If you look at one model and you look at another and you look at another, do you see any connections?

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- 9.1.123 David: Well...
- 9.1.124 T/R 1: Do you understand my question?
- 9.1.125 David: Yeah, I think so, on the second question, well, um, both my models were, um, like in this shape, like that.
- 9.1.126 T/R 1: Ok, that's neat. I haven't seen that model. Maybe you can build that one on the overhead when we're finished.
- 9.1.127 David: Cuz I think this was...
- 9.1.128 22:03 T/R 1: Ok, that's interesting. Ok, so if you were comparing three quarters and two thirds, how would you do it with that model?
- 9.1.129 David: Um, wait, this would be one whole, this is one half, and one of these would be one fourth.
- 9.1.130 T/R 1: Ok, that's one half and one fourth. But we're doing three quarters and two thirds.
- 9.1.131 David: Well, cuz this was I think was on the second question.
- 9.1.132 T/R 1: Right, but now we're doing three quarters and two thirds.
- 9.1.133 David: Let's see, um [starts playing with rods as he thinks]
- 9.1.134 T/R 1: You know Meredith, that's very interesting what you're telling Mrs. Phillips. I couldn't help but overhearing that, and I'm also talking to David here, but I have a question for you and David to think about, Ok?
- 9.1.135 Meredith: [interjecting] Mmm hmmm
- 9.1.136 T/R 1: Uh, I probably want you to tell David what you just told Mrs. Phillips. I sort of was listening on the side. Because then I have another question, a challenge for both of you. Why don't you tell David what you just did so David catches up? He was doing a different problem, right, David?
- 9.1.137 Meredith: [Meredith has built a model of a blue, brown, and black train, four dark green rods, and three brown rods, and has also included four red rods. As she speaks, she adds two white rods to the model] If you call all these, this one, and these fourths and these thirds, and you take twelve reds, you can call them twelfths, it would be bigger, if you take three thirds, three fourths would be bigger by one twelfth. Or it would be bigger by-
- 9.1.138 T/R 1: Just listen to the rest of what she's says, David, for a minute.
- 9.1.139 Meredith: Or it could be bigger by two twenty-fourths.
- 9.1.140 T/R 1: By two twenty-fourths or by one twelfth. Well, David may need to think about that a little bit, but I noticed that you have a different model here, and I'm going to let you explain that to David, also, but before you do, you can share that with David. I want you to tell me, this is my question to David also, Meredith, do you see any

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connections between these two models, ok? And now first of all explain it to David and tell him if you see any connections, and then see if you can even imagine a third model and how that would be connected, but it's important that David understands both of these first. Ok? So I'll leave

- 9.1.141 David: I think I have some, um, models,
9.1.142 T/R 1: I think so too.
9.1.143 David: But I just can't remember them.
9.1.144 24:20 T/R 1: But why don't you work with these? You don't have to build new ones. You should get a little closer to Meredith here and work with these because she has them built and use these two and see if you can imagine a third one even if you can't build it. But, Meredith, can you share this with David and then I'll be back because then I'll want to hear from it in a little bit.
- 9.1.145 Meredith: [Meredith has built a second model of an orange and red train, four light green rods, three purple rods, and twelve white rods] This [orange and red train] is called the one, these [light green rods] are the fourths, and these [purple rods] are the thirds, and these [white rods] are twelfths. It's, if you take, two thirds, three fourths,
- 9.1.146 David: Yeah, I know, I made the same model
9.1.147 Meredith: It's bigger by one twelfth. Easy.
9.1.148 25:05 David: That's what I kept on doing but what I'm saying is this. I kept on making the same shape when I did my models, like that. [David has the model of a purple rod, a red rod, and three white rods on his desk]
- 9.1.149 Meredith: Why don't you just work with me because we don't have really a lot of cubes?
- 9.1.150 David: I had a lot of models I just can't really remember any of them. I was working on the second question.
- 9.1.151 Meredith: I need ones. [laughs]. Can I use these ones? I really need ones. I need twenty-four ones.
- 9.1.152 David: [points to the white rods that are on Meredith's desk. inaudible. Meredith completes her first model by placing eight more red rods and twenty-two white rods in her model.]
- 9.1.153 Meredith: Do you have any more reds over there?
9.1.154 David: Yeah.
9.1.155 Brian: Three, those are the four, fourths
9.1.156 CT: A'right.
9.1.157 Brian: And these are the three thirds.
9.1.158 CT: Right, ok. I understand that so far.

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- 9.1.159 Brian: And so, so, they only asked for two thirds, so I took out one third
- 9.1.160 CT: Right
- 9.1.161 Brian: And they only asked for three fourths, so I took out one right there. And then they said, how, how much bigger is it, and I said by one twelfth, and I put it right there, and that's how I got it.
- 9.1.162 CT: You're calling this one twelfth.
- 9.1.163 Brian: Well, well, it, it takes it takes twelve of these to equal up to one, to equal up to all that. So it's one twelfth.
- 9.1.164 CT: How did you know this? Did you guess it or did you,
- 9.1.165 27:04 Micheal We experimented.
- 9.1.166 CT: You experimented with that?
- 9.1.167 Brian: Yeah, yeah.
- 9.1.168 CT: And it came out to twelfths?
- 9.1.169 Brian: I was just going to say that.
- 9.1.170 CT: Oh, wow, you people have three models, do you not?
- 9.1.171 Brian: Yeah.
- 9.1.172 CT: Oh, wait a minute. Or do you? You have one, two, and this is the same one.
- 9.1.173 Michael: This is the same one. Yeah.
- 9.1.174 CT: So you have two models, and they're asking you for one more.
- 9.1.175 Michael: We want each to have two different models.
- 9.1.176 CT: Excuse me?
- 9.1.177 Michael: Brian wants to have two models of his own, and I want to have two models of my own.
- 9.1.178 T/R 1: Kimberly, do you have some extras...
- 9.1.179 David: You don't have to fill it up, all you have to do is put it in there.
- 9.1.180 T/R 1: What do you need? Ones have become precious I don't see any ones in here. Some. Alright, we'll make a mess. One, two, three, four, five, you have a friend who also... here's some more, ok? You know, a suggestion I have, Alan and Erik, if you can find another table who's solving the same problem, maybe you can combine
- 9.1.181 Erik: Well, we need a lot more pieces. Well,
- 9.1.182 T/R 1: [speaking to other students]... smaller model. Maybe you can all come together. Maybe, uh, Meredith and David can help you. Ok, what do you have here, David? [to Erik] Here! [Erik says oh good]. Ok, where are we?
- 9.1.183 Meredith: If you call this a one, these fourths, these thirds, and these twelfths, and these twenty-fourths. And you take three thirds, two thirds- three fourths and two thirds, it's bigger by one twelfth or two twenty-fourths.

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- 9.1.184 T/R 1: Mmmm hmmm. Ok, I see that, you see that, too, David, and you showed us this one too, but now that's not my question, ok? I'm, I'm asking you a different question. You found in this model that three quarters was bigger than two thirds by
- 9.1.185 Meredith: One twelfth.
- 9.1.186 T/R 1: One twelfth, right? You found in this model that three quarters was bigger than two thirds by
- 9.1.187 Meredith: Two twelfths, two
- 9.1.188 T/R 1: Two twelfths - by one twelfth?
- 9.1.189 Meredith: Yeah, one twelfth
- 9.1.190 T/R 1: Or two twenty-fourths, right? Is that right? One twelfth or two twenty-fourths. So here, this was the difference, in your little model, and here this was the difference in the bigger model, correct? I'm asking you to imagine, ok, so, this is, I'm going to pull this out for a minute, this was your one twelfth, right? And this was your one twelfth or, two twenty-fourths, right? If you were to build a bigger model, can you predict, can you predict without building it, what your comparisons might look like? Can you predict it in your minds and maybe sketch it or...
- 9.1.191 31:50 David: It would probably be a much, much bigger, because if the model is, say, this big, it would need more reds and more whites than these, 'cause these are small.
- 9.1.192 T/R 1: Can you predict how many more reds and how many more whites? I need you to think about that.
- 9.1.193 Meredith: It depends how big the, uh, model is
- 9.1.194 T/R 1: Ok, that's, that's fair enough. So can you imagine one a certain size and able to predict how many reds and whites. You understand my question? That's a real good question for both of you to think about.
- 9.1.195 Meredith: [inaudible, laughs]
- 9.1.196 T/R 1: But, to be able to justify your answer, why don't you talk to each other about it, and see what you each think, and try to uh, convince each other first, and then you can try to convince me. Ok?
- 9.1.197 David: I think that this one [holding a red rod] might be one twenty-fourth, because
- 9.1.198 Meredith: No, because these are twenty fourths. These are twelfths. Well, if it was double the size of this
- 9.1.199 David: Yeah, I know, then this would be one twenty-fourth, and then this would be one, one forty-eighth, or something, yeah one forty-eighth. Question, then we might be using something like this, and this would be something like one twelfth or something.

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- 9.1.200 Kimberly: ... three quarters, and if you take one of the twelfths and you put it down here, it fits.
- 9.1.201 33:18 T/R 1: Hmm, that's really interesting.
- 9.1.202 Audra: And this is the same here.
- 9.1.203 T/R 1: Is that another model there, Audra?
- 9.1.204 Audra: Yeah, yeah, cuz this is the same here cuz this is the same size, because there's the same purples and it will fit twelve.
- 9.1.205 T/R 1: Ok, now, those models look to me the same. You have four greens and you have three purples, it's just that here you have, is it really different, though?
- 9.1.206 Kimberly: Not really
- 9.1.207 T/R 1: What number name is this?
- 9.1.208 Kimberly: That's a whole and that's a whole.
- 9.1.209 T/R 1: What number name did you give it?
- 9.1.210 Kimberly: A whole, one
- 9.1.211 T/R 1: What number name?
- 9.1.212 Kimberly: One
- 9.1.213 T/R 1: If this has the number name one and this has the number name one, uh, are they different or the same? Are the lengths the same or different?
- 9.1.214 Kimberly: They're the same.
- 9.1.215 T/R 1: Can you make one where the lengths, for what you pick one is going to be different? Are these models, I guess, this is my question to you, are they really different?
- 9.1.216 Kimberly: No
- 9.1.217 T/R 1: You see what I'm saying? Can you think of another?
- 9.1.218 Kimberly: Audra, can you help me, That one?
- 9.1.219 Audra: You don't need halves
- 9.1.220 Kimberly: I know but it's easier for me to find it
- 9.1.221 T/R 1: And, what rod would you use to represent one twelfth in that model?
- 9.1.222 Michael: In this one?
- 9.1.223 T/R 1: Yeah.
- 9.1.224 Michael: Hmm, probably, this one, let's see, just a second.
- 9.1.225 T/R 1: Just think backward.
- 9.1.226 Michael: Just a second, I'll try and measure.
- 9.1.227 T/R 1: That's very interesting, Brian and Michael. That's very very interesting. It's the red.
- 9.1.228 Brian: I know, I know [Michael shows that a red rod represents the difference between two thirds and three fourths.]
- 9.1.229 T/R 1: So you think you're going to use red to represent one twelfth

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- 9.1.230 Michael: I think. I also came up, I just came up with just came up with the- oh, here it is. [Michael has a second model of an orange and yellow train, three yellow rods, and is trying to place purple rods next to this model]. Nope, I didn't get up to another model.
- 9.1.231 Brian: Yes, I think I have fourths, Mike, Mike, wait, Mike, wait, I have one - I think I have one.
- 9.1.232 Michael: We already tried that one [Brian groans]
- 9.1.233 Brian: I'm frustrated
- 9.1.234 Michael: [laughs] I never thought this problem would be this hard.
- 9.1.235 [conversation between T/R 1 and Erik - view not on camera]
- 9.1.236 T/R 1: You might want to study Andrew's model to see what you have to do to make it bigger.
- 9.1.237 36:19 Erik: We did - we did two oranges and-
- 9.1.238 T/R 1: Right, but I want you to make one bigger than that.
- 9.1.239 Erik: I can divide it into thirds, but I can't divide it into fourths.
- 9.1.240 T/R 1: Maybe you gotta make it bigger.
- 9.1.241 Meredith: Ok, let's try to go to thirty. Let's maybe try to go to thirty. This is twenty-four, we need to make it six more. What is six?
- 9.1.242 David: [counting out white rods from Meredith's small model] One, two, you don't really need this anymore.
- 9.1.243 Meredith: [stopping David] I do
- 9.1.244 David: You don't really need that one.
- 9.1.245 Meredith: Well, I have an idea.
- 9.1.246 T/R 1: Yeah.
- 9.1.247 Meredith: Well, say we called it thirty.
- 9.1.248 T/R 1: Thirty.
- 9.1.249 Meredith: Yeah, um model. Thirty of the ... thirty ones, and
- 9.1.250 T/R 1: You're using thirty white ones to make your train, is that what you're telling me?
- 9.1.251 Meredith: Yeah
- 9.1.252 T/R 1: Using thirty white rods to call one? Will it work?
- 9.1.253 Meredith: No not thirty white ones, you would add a six block, which would be, I think would be this six [a yellow rod], yeah so this is six. That would make thirty and you would call the oranges thirds
- 9.1.254 T/R 1: Would that work?
- 9.1.255 Meredith: And some of
- 9.1.256 T/R 1: Well, try building that and tell me if that works.
- 9.1.257 Meredith: Ok.
- 9.1.258 T/R 1: That's, that's something to try. Why don't you try?
- 9.1.259 David: I also thought of, um,

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- 9.1.260 T/R 1: Can you get over there to help Meredith? Are you in an awkward situation where the blocks are down there? Would it be easier for you to put your chair here, do you think?
- 9.1.261 David: Well, I was also thinking about the other one. It was, um, it was, um, twice the size of that [pointing to Meredith's larger model] Then,
- 9.1.262 T/R 1: Hold on, let's hear what David says.
- 9.1.263 David: Then this, then the red would be, um, one twenty-fourth, the whites would be, I think that would be one forty-eighth.
- 9.1.264 T/R 1: Oh, so you're saying that if it would be twice the size.
- 9.1.265 David: And then this [light green] would be one twelfth.
- 9.1.266 T/R 1: That's very interesting. That's an interesting theory. Why don't you test the theory with Michael and Alan, I think they would like to hear this theory. Would you like to hear - I think David has a theory - why don't you come over here. They have an interesting - David has an interesting theory, I don't know if Meredith heard it, tell them his theory, now listen carefully, Jackie, you want to hear this theory?
- 9.1.267 Erik: They [pointing to Andrew's table] already had a theory, I heard it.
- 9.1.268 T/R 1: Ok, let's hear David's theory.
- 9.1.269 David: Well, before
- 9.1.270 T/R 1: You know this model, gentlemen, don't you?
- 9.1.271 Alan: Yeah.
- 9.1.272 T/R 1: Ok, listen to what he's saying with this model. Meredith? Ok, I'm ready to listen.
- 9.1.273 David: Well, before, we had this other one, um, where the whites were one twenty-fourth and the reds were one twelfth. But then if we double that, then the reds would be one twenty-fourth, the whites would be one forty-eighth, and then the light green would be one twelfth.
- 9.1.274 T/R 1: You may have to say that again. Alan is making a face.
- 9.1.275 Erik: I just I
- 9.1.276 Alan: No, meaning
- 9.1.277 T/R 1: You're thinking that's possible?
- 9.1.278 Erik: I heard what Andrew said was
- 9.1.279 T/R 1: I would suggest that all of you get your blocks together and pick a spot on the floor over there
- 9.1.280 Erik: But I heard-
- 9.1.281 T/R 1: And take some mats
- 9.1.282 Erik: But I overheard Andrew's - Andrew's doing, what he's doin' is he's makin' a train for the wholes and he said if you could make a train for one whole, why can't you make a train for the thirds and the fourths?

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- 9.1.283 T/R 1: Interesting question. Let me make a suggestion. If you put floormats on the floor, over there by Chris, who's running the camera-
- 9.1.284 Erik: He'll have to look straight down.
- 9.1.285 T/R 1: And took all your - he'll manage - and take all your rods, all your boxes, why don't you try building David's model and see if it works.
- 9.1.286 David: Um, but
- 9.1.287 T/R 1: You can destroy this, because someone else has it. You will use someone else's and you help them, ok Meredith? Because you'll need the blocks.
- 9.1.288 David: What was yours before? Was it like two blues... no
- 9.1.289 T/R 1: Remember what this is, though.
- 9.1.290 David: No, one blue, one black, and um, one
- 9.1.291 Meredith: No, one blue, one brown and one black.
- 9.1.292 T/R 1: You might want to spread your mats on the floor and make a big model together, but you should put your mats on the floor - all four mats. You'll work right here. Um, you guys need to watch Andrew, and Jessica.
- 9.1.293 40:29 Andrew: Erik, I made it. [Andrew has built a model of a train of four orange and one brown rod, six brown rods, and eight dark green rods]
- 9.1.294 Erik: What? Let's see if you could divide by ones.
- 9.1.295 Andrew: Let's see if I can get it to twelfths.
- 9.1.296 Erik: Ten, twenty, thirty, forty, fortieths, forty forty
- 9.1.297 Jessica: Well, it worked!
- 9.1.298 Andrew: Maybe these.
- 9.1.299 Erik: Forty eighths! Hey you're - that's the same one we're gonna do!
- 9.1.300 Andrew: Really?
- 9.1.301 Jessica: Really? Well, how come you didn't do it yet?
- 9.1.302 Andrew: Two, four, six, eight, ten, twelve, I got it. I got the twelfths [Andrew adds twelve purple rods to his model]
- 9.1.303 Jessica: The twelfths?
- 9.1.304 Andrew: Yep! The twelfths are purples. Well, I got the biggest model
- 9.1.305 Jessica: He's doing something different. He's counting this as one third.
- 9.1.306 Andrew: I'm counting two browns as one third, and two greens as one fourth.
- 9.1.307 T/R 1: That's interesting.
- 9.1.308 Andrew: And purples would be
- 9.1.309 T/R 1: Is that ok to do, Jessica?
- 9.1.310 Jessica: Yes.
- 9.1.311 T/R 1: That's a way to do it! Ok, that's a different way.
- 9.1.312 Andrew: One twelfth
- 9.1.313 T/R 1: What would the purples be?

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- 9.1.314 Andrew: Twelfths.
- 9.1.315 T/R 1: Ok, neat!
- 9.1.316 Andrew: Now we need two more.
- 9.1.317 Jessica: That needs about three pieces of paper.
- 9.1.318 Andrew: There!
- 9.1.319 T/R 1: Did you make another one, Sarah?
- 9.1.320 Andrew: There!
- 9.1.321 T/R 1: Brian, look what Andrew's doing! What do you think he's doing, Michael?
- 9.1.322 Andrew: See, these two are thirds, and these two are fourths.
- 9.1.323 43:00 T/R 1: Come on Michael, let's wait for Michael to tell Michael what you've done.
- 9.1.324 Andrew: I took two browns and minded them as thirds, one third, and then two browns is one third, and two greens is one fourth, and then the purple would be one twelfth.
- 9.1.325 Brian: Oh! I get it - Ahah! I think I have one now - look! Those are eight, this is twenty four, Mike, twenty-four, look, Mike, I have one!
- 9.1.326 T/R 1: So how many twenty-fourths would it be with reds?
- 9.1.327 Andrew: Twenty four, so the red would be one twenty-fourth.
- 9.1.328 T/R 1: Ok, would the difference be one twenty-fourth?
- 9.1.329 Andrew: No, the difference is, let's see, three fourths, the difference is one twelfth.
- 9.1.330 T/R 1: One twelfth. What is the difference in twenty-fourths?
- 9.1.331 Andrew: Um, two twenty-fourths.
- 9.1.332 T/R 1: Two twenty-fourths, ok? Now could you subdivide it smaller than the red?
- 9.1.333 Andrew: Yeah, you could divide it into smaller by taking, by taking two whites and putting them up against everything.
- 9.1.334 T/R 1: Ok, you know how many of those there'll be?
- 9.1.335 Andrew: Well, there'd be, let's see, two times twenty-four is... it would be forty-eight.
- 9.1.336 T/R 1: Forty-eight? Ok. So in forty-eights, what would your answer be?
- 9.1.337 Andrew: Four.
- 9.1.338 T/R 1: Four of them. Would you write that up? in words, what you just said, I'm going to ask you to share that in a minute? But I'd like you to besure Jessica understands what you've just done. Because you just told me the answer in forty-eighths.
- 9.1.339 Jessica: Yeah, because-
- 9.1.340 T/R 1: What do you think, Jessica?
- 9.1.341 Jessica: You're putting rods up to it now?

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- 9.1.342 Andrew: Yeah, and if you take two whites and you put them up to the reds-
- 9.1.343 Jessica: And then that's
- 9.1.344 Andrew: -they would be yeah, twenty-four times two equals forty eight
- 9.1.345 Jessica: [simultaneously] forty eight.
- 9.1.346 T/R 1: Is that interesting? That's just, just really neat. So, I would like you to write up your solution to that one [inaudible] Um, you could do this one, you could do this one, and you could [inaudible]
- 9.1.347 Erik: Alan you're stealing go to front camera for accurate transcript and coding
- 9.1.348 Alan: No I'm not!
- 9.1.349 Erik: Alan, you're stealing from us!
- 9.1.350 Alan: Us?
- 9.1.351 Erik: Oh! Oh! And the thirds... And the thirds, the thirds can easily be done by the blues, oh I've got a good idea. The thirds, and how much room do we have left? We have one blue left! Which is nine! One two three, four five six, seven eight nine!
- 9.1.352 Meredith: You need the brown rod.
- 9.1.353 Erik: It all works out
- 9.1.354 Alan: You know you could try use three blues, and the light green, then use the oranges to third it. Then you could fourth it easily.
- 9.1.355 Erik: Mmmm.
- 9.1.356 46:33 Meredith: I already have the thirds. See? I took off the purple and the, I took off the green
- 9.1.357 Alan: Do you have any blues?
- 9.1.358 Meredith: Yeah, but three of these.
- 9.1.359 Alan: And the light green.
- 9.1.360 Erik: I did it!
- 9.1.361 Alan: Easily your thirds can be used.
- 9.1.362 Erik: Hello! Alan! I did it!
- 9.1.363 Alan: You fourthed it too?
- 9.1.364 Erik: Yeah! One two three four. I thirded it, one two three, and then plus nine more of those, which will be one two three, four five six, seven eight nine.
- 9.1.365 Alan: Now look at this!
- 9.1.366 Erik: So it's just like making a new rod.
- 9.1.367 Alan: Fourthing it.
- 9.1.368 V1: Can you run that by me again? That's a little-
- 9.1.369 Erik: Ok.
- 9.1.370 V1: I'm not quite following it.

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- 9.1.371 Erik: Dave, could you move for a second? Ok. What I have, the three, and then I put nine other ones, which would equal another blue
- 9.1.372 V1: Ok.
- 9.1.373 Erik: So if I thirded it, I would add one to there, one to there, then one to there, which would be three, and then four five six seven eight nine, so it's like adding another blue but making a new rod.
- 9.1.374 Meredith: What, this?
- 9.1.375 Erik?: I'm making a blue rod.
- 9.1.376 V1: Ok, can you set that up
- 9.1.377 Meredith: It can't be it [see Meredith's model]
- 9.1.378 Erik: Well, the thirds
- 9.1.379 V1: Just a little bit, use the same pieces but can you set it up a little differently
- 9.1.380 David: Oh, I have an idea, put the three next to that, and the three next to that, and the three next to that.
- 9.1.381 Erik: What?
- 9.1.382 David: I'll show you what I mean. Can I have some more [rods]?
- 9.1.383 Alan: Wow, wow, wow, wow, hey! Someone drew on this!
- 9.1.384 Erik: Alan, most of them all have muck [?]
- 9.1.385 Erik: How can we make it bigger than him? He did the exact same thing.
- 9.1.386 Meredith: There!
- 9.1.387 Erik: Ohhhhh!
- 9.1.388 Meredith: There! Get it?
- 9.1.389 Erik: Ohhhhhh! See there are three to that, three to that, and three to that, so it's like, it's a blue, plus one would be an orange, plus another would be a new rod, plus another would be a new rod. And then if you have another one, you'd just, you're just making new rods. Cuz if you add one of those to that, it'd be an orange. But then you add another two, it'd be bigger than an orange. [describe the evolving model]
- 9.1.390 V1: I got you.
- 9.1.391 Erik: Hmmmm. Or you could just take the oranges and do that.
- 9.1.392 49:01 Alan: No just take out those uh,
- 9.1.393 ?: no those would uh
- 9.1.394 Erik: you could take out an orange
- 9.1.395 Meredith: You could take an orange and use two ones
- 9.1.396 Alan: You could take out three
- 9.1.397 Meredith: Orange-
- 9.1.398 Alan: Erik, you could take out three six nine and put a blue in there

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- 9.1.399 Meredith: Orange and six purples. Wait! Wait a second! Aren't these nines? Weren't these nines, right? And these are tens, right?
- 9.1.400 Erik: Yes, tens.
- 9.1.401 Meredith: But, if they're tens, [inaudible] see what I mean? You put the, uh, put the
- 9.1.402 Erik: You know why the blue's bigger than em? Because they have the three whites added to em.
- 9.1.403 Meredith: No the whites, the orange is bigger.
- 9.1.404 Erik: Of course, because the orange is ten, those are nine.
- 9.1.405 CT: I don't want to break your train of thought, but what's happening here?
- 9.1.406 Erik: Well, see, we took the three oranges and the dark green to be one, and then the four blues to be um, the fourths, and down here, we took three blues, and then, uh, nine whites, and we took three whites which would go to that one, so we're making a new rod because if you had one it'd be an orange. If you had two other ones it'd be bigger than an orange so we're making a new rod there and we do the same here and the same here, so we're making new rods for thirds.
- 9.1.407 CT: Ok.
- 9.1.408 Erik: Understand?
- 9.1.409 CT: Yes, I do.
- 9.1.410 Erik: [laughs] That's the only problem. Actually, no, I do! He was calling two browns, two blacks, and two blues, a one
- 9.1.411 David: Yeah, because that was, that was the other problem.
- 9.1.412 Erik: Yeah, and then the light greens are the twelfths and those are the
- 9.1.413 David: I think that would be sixteen, though.
- 9.1.414 Erik: Yeah, and the reds would be the twenty-four, twenty-fourths, the reds would be the twenty-fourths, and the white would be the forty-eighths.
- 9.1.415 T/R 1: [maybe to someone else?] What did you get the difference to be?
- 9.1.416 Erik: Because he, he just doubled everything.
- 9.1.417 Meredith: What are the thirds? What are the fourths?
- 9.1.418 Erik: Exactly.
- 9.1.419 David: I'm just working on mine.
- 9.1.420 Erik: He's working on that. David, that's basically what we came here for.
- 9.1.421 CT: Yeah, I do, that's very interesting! Do you understand how you would get fourths and thirds out of that?
- 9.1.422 Erik: David, isn't this basically what we came for?
- 9.1.423 Alan: He's getting it lined up, trying to get it lined up.

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- 9.1.424 Erik: Yeah, he's messing up. So basically, we don't need this, all this. We could just push that aside, and work with David's. Isn't this basically what we came here for, David?
- 9.1.425 David: Yeah, I know, that's why-
- 9.1.426 Erik: [laughs] And everyone is trying to make another model!
- 9.1.427 David: I know cuz I told-
- 9.1.428 CT: Basically you came here for what?
- 9.1.429 Erik: We basically came to discuss David's original model.
- 9.1.430 CT: And then they built something else?
- 9.1.431 Erik: Yeah, we forgot the whole point why we came here.
- 9.1.432 David: Yeah, I told everybody, and then she said to go over there and build David's model.
- 9.1.433 Erik: And we lost the point for some reason.
- 9.1.434 CT: Ok, but I don't think David did this.
- 9.1.435 Erik: No, David's like here, let me do this.
- 9.1.436 CT: David, how about you explain to me what you're doing so [inaudible] your thinking.
- 9.1.437 David: Well, before Meredith built this other thing and then she had the reds were one twelfth and then the whites were one twenty-fourth, but then
- 9.1.438 Erik: We built that, me and alan built that and then they did it, and then
- 9.1.439 52:53 David: Meredith did too, but then, uh, so then, uh, she thought to think of a bigger model, then I thought that then maybe the greens would be something like one twelfth, but then we figured out that would be sixteenths, then I put them up there
- 9.1.440 CT: Alright
- 9.1.441 David: And
- 9.1.442 Erik: No it wouldn't this one still has some room. I think.
- 9.1.443 David: No, it's just that this [inaudible]. Well um, and then I thought the reds would be one twenty-fourth and the whites might be one forty-eighth. Cuz I just doubled it.
- 9.1.444 CT: Did it work out? Did it work out?
- 9.1.445 David: What?
- 9.1.446 CT: Did it work out? I mean, did you, did you find what you thought you would find?
- 9.1.447 David: Well, not really, because this one was one sixteenth, um, one sixteenth.
- 9.1.448 CT: And the reds came out to?
- 9.1.449 David: I was working on that right now.
- 9.1.450 CT: Oh, ok.

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- 9.1.451 Erik: What about the purples? How about the purples? The purples could come out to be.
- 9.1.452 David: Yeah they might be the-
- 9.1.453 Erik: I think the purples would be, the purples would probably be twelfths.
- 9.1.454 David: Alright, so now,
- 9.1.455 CT: This is so interesting, where are you going with this, though? Where are you going with this? I mean, this is very interesting, I'm enjoying this very much. You put a lot of work into it.
- 9.1.456 Alan: This isn't going to fit on notebook paper.
- 9.1.457 CT: We can take, listen, we can take this and paste it together and put your work on
- 9.1.458 Erik: Well, it barely even fits on this!
- 9.1.459 CT: Well, you have more than one piece there, so there's no problem. We can do that.
- 9.1.460 54:16 Erik: I mean, if it doesn't fit on this, of course it can't fit on a single piece of notebook paper, but if we put a couple of pieces together
- 9.1.461 CT: It's ok, we can set up a model. What should we?
- 9.1.462 David: I think, maybe I counted wrong but that, but I counted it to be one twenty-third. Let me count again.
- 9.1.463 CT: Look and see. See if you have it even.
- 9.1.464 Erik: One two three, four, one two three
- 9.1.465 T/R 1: They don't look lined up there, David. David, I'm not convinced they're lined up.
- 9.1.466 Erik: Eleven twelve thirteen fourteen fifteen sixteen
- 9.1.467 Alan: Dave, you have something wrong, you need another
- 9.1.468 Erik: Twenty-three. You need to line them up.
- 9.1.469 Alan: Here, you've got, yeah, you need another one of that.
- 9.1.470 T/R 1: How about a ruler, would that help? The yardstick, behind the board there? A yardstick might help.
- 9.1.471 Erik: Yeah [gets up].
- 9.1.472 T/R 1: See it over there?
- 9.1.473 Alan: Now, push, push, push the reds down.
- 9.1.474 Erik: Just push em in, and then you can get one more.
- 9.1.475 Alan: There.
- 9.1.476 Erik: Now put one more on.
- 9.1.477 Alan: Take a yardstick and flatten the whole thing out.
- 9.1.478 Erik: What do you mean, flatten it out?
- 9.1.479 Alan: It's all wavy.
- 9.1.480 Meredith: Yo!!! I just worked [inaudible]

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- 9.1.481 Erik: No, I mean, it's not ok, cuz, no offense Meredith, but isn't this called the major model we're working on?
- 9.1.482 David: That's what we're doing.
- 9.1.483 Meridith: That's why we came over here.
- 9.1.484 Alan: Ok. Pointless.
- 9.1.485 Erik: Nine, ten, eleven, twelve, thirteen, fourteen fifteen, oops, sorry. I just think the purples
- 9.1.486 Alan: Is that enough?
- 9.1.487 Erik: One two three four five six seven eight nine ten
- 9.1.488 David: This is going to be twelve.
- 9.1.489 Erik: Eleven Twelve
- 9.1.490 David: I know it. The purples
- 9.1.491 Erik: Five six seven eight nine ten eleven twelve. There we go.
- 9.1.492 Meredith: [Alan begins to straighten the model with the yardstick] No, that side's
- 9.1.493 Erik: You don't really need- Wait a minute, now I just gotta do the thirds and fourths.
- 9.1.494 David: Don't touch anything now.
- 9.1.495 Erik: One two three four five six
- 9.1.496 David: Don't touch anything. [David gets up and leaves view of camera for a minute and returns] I think the ones would be one forty-eighth
- 9.1.497 Erik: Wait, four, eight twelve, just count by fours, cuz.
- 9.1.498 57:29 David and Erik: Two four six eight ten twelve fourteen sixteen eighteen twenty twenty-two twenty-four twenty-six twenty-eight.
- 9.1.499 David: Thirty.
- 9.1.500 Erik: Two four six eight ten twelve fourteen sixteen eighteen twenty twenty-two twenty-four twenty-six twenty-eight thirty, thirty-two, thirty-four, thirty-six, thirty-eight, forty, forty-two, forty-four, forty-six, forty-eight. Yep, forty-eight.
- 9.1.501 T/R 1: Are you surprised that it's forty-eight?
- 9.1.502 David: No, that's what I thought it would be.
- 9.1.503 T/R 1: That's what you guessed? In other words, you were able to build what you thought, what you predicted. Are you going to be able to write this up?
- 9.1.504 David: Um, well, not draw, maybe not
- 9.1.505 T/R 1: Maybe sketch it, maybe you want to take some notes on your diagram before it ends. What do you think, Meredith? You think you made another, you made a different model. Ok, you might want to take some notes to sketch it so you remember what you did. So you can start

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- 9.1.506 David: Cuz I thought the greens were the purples one twelfth.
- 9.1.507 Erik: So I think what I'm gonna do
- 9.1.508 T/R 1: So you think the purple's one twelfth - is there another name for that purple?
- 9.1.509 Erik: Um, one, one
- 9.1.510 T/R 1: Meredith knows how to find other names for these
- 9.1.511 Erik: One twelfth
- 9.1.512 T/R 1: That's one name, one twelfth. Is there another number name for the purple?
- 9.1.513 Erik: One fourth, no. I mean, uh, what's it called. Wait,
- 9.1.514 T/R 1: If you were using-
- 9.1.515 Erik: One whole!
- 9.1.516 T/R 1: If, let me ask you this
- 9.1.517 Erik: One whole, one half
- 9.1.518 T/R 1: Don't just guess cuz you're gonna have to prove it to me, Erik. This is my question, to, to Meredith, who likes to come up with different number names and Erik sometimes says on the tape, "I don't know why we have to have more names. I like to have lots of names, frankly. Um,
- 9.1.519 David: Four twelfths.
- 9.1.520 T/R 1: Ok, David thinks four twelfths
- 9.1.521 Erik: One twelfth! One twelfth!
- 9.1.522 T/R 1: We know it's one twelfth, we've proved it's one twelfth and you've proved it's one twelfth.
- 9.1.523 Erik: Four twenty-eighths. I mean, four forty-eighths.
- 9.1.524 T/R 1: Four forty-eighths.
- 9.1.525 Erik: Because the whites would be, the whites would be forty-eighths, and then, and then it takes
- 9.1.526 David: [interjecting]-I didn't mean-
- 9.1.527 Erik: [continuing] Four whites to equal up
- 9.1.528 David: Four twelfths.
- 9.1.529 Erik: Four forty-eighths.
- 9.1.530 T/R 1: You mean four forty-eighths.
- 9.1.531 Erik: I said four forty-eighths.
- 9.1.532 T/R 1: Meredith? You think that makes sense?
- 9.1.533 Erik: Four forty-eighths or
- 9.1.534 Meredith: One twelfth.
- 9.1.535 Erik: One twelfth.
- 9.1.536 T/R 1: So we have one twelfth, we have four forty-eighths. Any other names?

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- 9.1.537 Erik: Oh, wait! Oh, yeah! Two, two, two twenty-fourths!
- 9.1.538 T/R 1: Two twenty-fourths.
- 9.1.539 Erik: Two twenty fourths
- 9.1.540 59:56 T/R 1: Ok, we have one twelfth, two twenty-fourths, four forty-eighths, anything else? How many different number names and different blocks.
- 9.1.541 Erik: Well, does it have to be the same whole?
- 9.1.542 T/R 1: What do you think?
- 9.1.543 Meredith: It can also be bigger by, um,
- 9.1.544 Erik: Two, or it can be thirds, halves, it could be a
- 9.1.545 T/R 1: What are green? What's one green?
- 9.1.546 Erik: Those are sixteenths.
- 9.1.547 Meredith: One sixteenth and one forty-eighth.
- 9.1.548 T/R 1: One sixteenth.
- 9.1.549 Meredith: Or one forty-eighth.
- 9.1.550 T/R 1: How did you get sixteenths?
- 9.1.551 Erik: Because there are sixteen that line up to the answer.
- 9.1.552 Meredith: One sixteenth
- 9.1.553 T/R 1: Show me they're sixteen.
- 9.1.554 Erik and Meredith: One two three four five six seven eight nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen.
- 9.1.555 T/R 1: Ok, so the green is one sixteenth. But is the difference between three quarters and two thirds a green?
- 9.1.556 Erik: Is the difference between
- 9.1.557 Meredith: Oh, a green and blue, one forty-eighth.
- 9.1.558 T/R 1: So how would, what number name would you give for the differences between
- 9.1.559 Erik: Also, the, it also could be it would take two of them to equal up to a brown.
- 9.1.560 T/R 1: Well, these are the things I want you to think about and write about. Ok? I think these are good questions that are for you. We're up to seventh grade math already.
- 9.1.561 Erik: Seventh?
- 9.1.562 T/R 1: So I think you could work it out if you worked hard enough.
- 9.1.563 Meredith: Yeah, but I think if you took one sixteenth and one forty -eighth and you put it up to it, it
- 9.1.564 T/R 1: The difference? Oh, so what number name would you give to that?
- 9.1.565 Meredith: Uh, one forty eighth [laughs] I don't-
- 9.1.566 T/R 1: Well, think about it. [to class] Ok. I think we have to clean up
- 9.1.567 Class: Ohhh!

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- 9.1.568 T/R 1: I know, I'm sorry, I really am, I hope maybe Mrs. Phillips will let you work on this tomorrow and actually finish writing up what you're doing and describing it for Monday. Is that possible, Mrs. Phillips, that maybe tomorrow they can continue this and finally summarize and write this up?
- 9.1.569 CT: Sure.
- 9.1.570 T/R 1: Oh, good work! You have to think about that! You have to think hard about it. No guessing, you have to be able to prove it to me, ok?
- 9.1.571 T/R1: Mrs. Phillips, can they take their papers and work on them tomorrow. On Monday.
- 9.1.572 1:02:36 Clean up.