8.2.32   Erik: Ok. Let's see.

8.2.33   Alan: The other day we were doing the um, brown, and we were making

8.2.34   Erik: Yeah, but can't we just do singles?

8.2.35   Alan: No.

8.2.36   Erik: Why not?

8.2.37   Alan: You can't quarter the browns.

8.2.38   Erik: But you can quarter the dark greens

8.2.39   Alan: But you can't fourth the dark greens

8.2.40   Erik: How do you know?

8.2.41   Alan: Because you can only halve and third the dark greens.

8.2.42   Erik: One, two, three

8.2.43   CT: Before you start, put your names on your paper, we had an anonymous and we don't know who it was. Alan, your name on your paper

8.2.44   Alan: Both of em?

8.2.45   Erik: You only got two?

8.2.46   Alan: I got [inaudible]

8.2.47   Erik: Halves

8.2.48   Alan: Ok, um, the dark greens, the dark greens could third this.

8.2.49   Erik: No it can't

8.2.50   Alan: Oh yeah you're right. Again, black,

8.2.51   Erik: You you took all the purples

8.2.52   Alan: There were only four in here.

8.2.53   Erik: Why did you take 'em all?

8.2.54   Alan: Can't help it.

8.2.55   Erik: Yeah right. Just give me f- just give me three.

8.2.56   Alan: Whoa, [makes noise] But that would be equal as an orange.

8.2.57   Erik: What? But you can't, you can't uh third oranges

8.2.58   Alan: What?

8.2.59   Erik: You can't third oranges you can only halve them, divide 'em

8.2.60   Alan: I suggest this.

8.2.61   Erik: Ok, I guess you do suggest that. [Places and orange and red train] Then you divide them equally halve by by thirds, I should say, the purples.

8.2.62   Alan: De purples And zen

8.2.63   Erik: But then you can't halve them if you do it like this, oh yeah you can. I think we need another thing.

8.2.64   Alan: No we don't. And here are the quarters, or the fourths, look. [Alan's model: An orange and red train, two dark greens, two purples because there were no more, and four light greens]

8.2.65   Erik: Ok, what are the quarters? Uhh. [Alan places a third purple rod down.]

8.2.66   Alan: It's, I call it borrowing. Only in a different way.

8.2.67   Erik: Ok, there's one model. Now, what is the question? Three fourths or one half? Ok, one two three, oh yeah three fourths are definitely bigger by

8.2.68   Alan: A half

8.2.69   Erik: One

8.2.70   Alan: Three fourths are bigger than a half

8.2.71   Erik: No.

8.2.72   Alan: by one half

8.2.73   Erik: No. Three fourths, three fourths by one half by one fourth. See, look, see look, one half, one two three. Three fourths

8.2.74   Alan: Yet again I have to show you my logic.

8.2.75   Erik: You don't need to.

8.2.76   Alan: See? How much more would it take to make it? It would either take two fourths or one half.

8.2.77   Erik: Look at this.

8.2.78   Alan: Or six sixths.

8.2.79   Erik: You're weird. Ok. Look at this. One two three, three fourths go there.

8.2.80   Alan: Here's the logic in mine.

8.2.81   Erik: It's one, it's one fourth.

8.2.82   Alan: It, look, this is one fourth, is it one fourth bigger? I don't think so. It would either be two fourths, one half, or six sixths.

8.2.83   Parish: Wait, what's your argument?

8.2.84   Erik: He thinks that it would be one half bigger, but it shows here that it'd be one two, this.

8.2.85   Parish: Wait, show me which ones your whole is.

8.2.86   Erik: I think that, Alan you're doing it with thirds! They're fourths! Why are you doing it with thirds?

8.2.87   Parish: Wait, just explain to me what you're doing.

8.2.88   Erik: Ok, what I'm doing is I'm doing three fourths, and they end here. And then,

8.2.89   Parish: Ok, do you agree with what he is saying?

8.2.90   Erik: But then one half is smaller

8.2.91   Parish: Where's your one half?

8.2.92   Erik: The one half's are there.

8.2.93   Parish: Alright. The dark green ones.

8.2.94   Erik: The dark greens. And if you put this one up there it'll equal three fourths. So I think three fourths is larger than one half by by one, one fourth.

8.2.95   Parish: And you don't agree with him?

8.2.96   Alan: No

8.2.97   Parish: Well, wait, what's wrong with what he says.

8.2.98   Alan: Here's what's wrong. These are the three fourths, I mean oh yeah the three fourths

8.2.99   Parish: Wait, which are you,

8.2.100   Alan: Oh, it's the thirds.

8.2.101   Erik: That's what I was trying to tell you.

8.2.102   Alan: Oh yeah.

8.2.103   Parish: So now do you agree with him?

8.2.104   Alan: Yeah. I guess so.

8.2.105   Parish: You guess so?

8.2.106   Alan: Yeah

8.2.107   Parish: You're not sure?

8.2.108   Alan: I agree.

8.2.109   Erik: So now I just have to figure out another one.

8.2.110   Parish: I think you did a very good explanation. But now you have to go.

8.2.111   Erik: One more.

8.2.112   Alan: I guess

8.2.113   Parish: But wait, did you draw that one?

8.2.114   Erik: Oh no, oh yeah, I have to draw

8.2.115   Parish: You'd better draw that one. So Dr. Maher can see it.

8.2.116   Erik: I'd prefer to trace.

8.2.135   Erik: Well, I saw that that the three fourths and the one half, the one half will definitely be smaller than the three fourths,

8.2.136   T/R 2: Mmmm hmmm

8.2.137   Erik: But again like we did before, I put that on top of the other half, and it equaled up to the same as the uh three fourths. So I figured that one half would be smaller than three thirds by one, smaller than three fourths by one fourth.

8.2.138   T/R 2: Ok. Do you agree with that, Alan? You have a different model you want to show me?

8.2.139   Alan: Yeah, I wrote down that other model that

8.2.140   T/R 2: And now you're working on this one.

8.2.141   Alan: Yeah, here's mine, with the brown, this would be the half, and here are the three thirds. Now it would take one more to fill in the gap so it's one third bigger. I mean a fourth, one fourth bigger.

8.2.142   T/R 2: Alright, so you're calling the red ones one fourth, the number name one fourth.

8.2.143   Alan: Yeah, mmm hmmm.

8.2.144   T/R 2: Ok, that's very interesting, so yours came out to be a difference of a fourth and your model came out to be a difference of

8.2.145   Erik: Yeah, a difference of a fourth

8.2.146   Alan: Yeah, but that's the conclusion using past information. Every time you make something like this, it will always be one fourth on this one if it's one fourth on that, and any other model that you make that can be like this it will always be one fourth.
          Generalization

8.2.147   T/R 2: Oh, that's interesting.

8.2.148   Erik: Alan, I'm not going to do this one. this one

8.2.149   T/R 2: That's an interesting theory. You think that works for

8.2.150   Alan: Because if you did this, you could, these would be the halves, and you could imagine just having one big whole rod there. Now to fourth this, it would take, may I borrow one of these? Continues argument

8.2.151   Erik: No, oh yeah, I guess.

8.2.152   Alan: May I borrow one of these? And if it would be one there, it would be one half and three thirds. And this might equal up to a purple, that would be one fourth right there. So it would always be one fourth of that.

8.2.153   T/R 2: Ok, so you think it doesn't matter whatever model you build the difference

8.2.154   Alan: Yeah, it will always come out to the same answer.

8.2.155   T/R 2: Interesting, that's an interesting theory. Ok. I like that. Ok.