

<b>Description: B41, The Gang of Four (Jeff and Stephanie view), Grade 4, March 10, 1993, raw footage</b> <b>Location: Harding School</b> <b>Researcher: Professor Carolyn Maher</b> <b>Date: 3/10/92</b>	<b>Authors: Elizabeth Snee</b> <b>Verified: Robert Sigley</b> <b>Date Transcribed: 4/2/2014</b> <b>Page: 1 of 36</b>
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Line	Time	Speaker	Transcript
1		<b>R1</b>	Anyway, do you know why you're here?
2		<b>Jeff</b>	No.
3		<b>Michelle</b>	Yeah. About the towers.
4		<b>R1</b>	About the tower. Milin?
5		<b>Milin</b>	Yeah about the towers. We're going to talk about this.
6		<b>R1</b>	Yeah, yeah, yeah. You know the tower problem?
7		<b>Jeff</b>	Yes I do.
8		<b>R1</b>	Yeah, the last one in class you did, remember what that was about?
9		<b>Jeff</b>	Robin Hood. That was the last one we did.
10		<b>Stephanie</b>	The towers of 5.
11		<b>Stephanie &amp; Jeff</b>	The towers of 5.
12		<b>R1</b>	The towers of 5. And do you remember what you did with those towers of 5?
13		<b>Jeff &amp; Stephanie</b>	Yeah.
14		<b>R1</b>	And tell me about it. What was the problem?
15		<b>Jeff</b>	How many [Michelle: You had to figure out...] to make 5.
16		<b>Michelle</b>	...how many towers you could make.
17		<b>Jeff</b>	Different towers you can have.

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18		<b>Michelle</b>	Different towers you could make from 5 blocks up.
19		<b>R1</b>	Any 5 blocks?
20		<b>Stephanie</b>	No.
21		<b>Michelle &amp; Milin</b>	It had to be 2 colors.
22		<b>R1</b>	Okay, and did you figure that out?
23		<b>All students</b>	Yeah.
24		<b>R1</b>	And what is it, do you remember?
25		<b>All students</b>	32
26		<b>R1</b>	You sure of it?
27		<b>All students</b>	Yes.
28		<b>R1</b>	How could you be so sure?
29		<b>Milin</b>	Because we all ready checked!
30		<b>R1</b>	How could you be so sure?
31		<b>Jeff</b>	Remember we did all those, the, the charts, the thingys for, [Milin: And then remember...] and all those different patterns? Remember I convinced you up in the, the watchamacallit...
32		<b>R1</b>	Yes, in the room.
33		<b>Jeff</b>	I don't feel like convincing you again.
34		<b>R1</b>	You don't feel like convincing me again, okay. Okay, but I remember saying to you, Jeff, and I remember saying to you, Michelle, and to you, Stephanie, and Stephanie did try to work on towers of 6. And I asked all of you...

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35		<b>Michelle</b>	So did I.
36		<b>R1</b>	You did it. If you were building towers of 6, how many would there be.
37		<b>Jeff</b>	I didn't do it.
38		<b>Michelle</b>	I, I did some, but I didn't...
39		<b>R1</b>	But do you know how many?
40		<b>Stephanie</b>	Yeah.
41		<b>Milin</b>	Probably 64.
42		<b>R1</b>	Why do you think 64?
43		<b>Milin</b>	Well because there was a pattern.
44		<b>R1</b>	What's that?
45		<b>Milin</b>	You just times them by 2, and then...
46		<b>R1</b>	Times what by 2?
47		<b>Milin</b>	The towers by 2 because 1 is 2 and then you figure out 2 is 2 and then I mean 4. And then...
48		<b>Michelle</b>	See, if you only had 1 block...
49		<b>Jeff</b>	You're not making much sense.
50		<b>R1</b>	See, Jeff, okay, okay.
51		<b>Michelle</b>	If you have 1 block and 2 colors then you would have 2 towers and we figured out that the other day that you keep on adding 2...
52		<b>Jeff</b>	That was the opposites.
53		<b>Michelle</b>	You, you like 2 times 2 would be 4 and then the 3...

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54		<b>R1</b>	So 4 would be for what?
55		<b>Michelle</b>	Four for there, there would be 4 towers for 2 high.
56		<b>R1</b>	Okay.
57		<b>Jeff</b>	It's always opposite though.
58		<b>R1</b>	Okay, but let me, let me hear what Michelle has to say.
59		<b>Michelle</b>	And then for the 3 high then you would have 8 towers. And then for 4 high, you would have 12 towers. And we kept on doing it like that.
60		<b>R1</b>	Do you agree with that?
61		<b>Jeff</b>	I don't know what you're talking about.
62		<b>Stephanie</b>	Well, what it is, is...
63		<b>R1</b>	Let's, let's stop here.
64		<b>Michelle</b>	And then for 5 towers, it'd be 25 then. And then...
65		<b>R1</b>	Okay, let's, let's get a piece of paper and write down what you're saying and see if you all agree. And I think Jeff hasn't been with us for a while, and he doesn't know what we're talking about, but let's take one at a time. And let's just agree as we're moving along. Go, go ahead, Michelle.
66		<b>Michelle</b>	If you had one high, saying there's red and blue. Then you would have 2. And then if you had...
67		<b>R1</b>	Okay, write that down. 2. Do, do you agree with that? [Jeff: Yeah] Do you know what she's talking about?
68		<b>Jeff</b>	There's one red and there's one blue. So you, there's only one way to do it so it's 2.
69		<b>R1</b>	One way to do it so it's 2?

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70		<b>Jeff</b>	Yeah, see, if, if you have to make towers of one, and there's only two colors.
71	3:04	<b>Milin</b>	He doesn't beyond(?)doing that.
72		<b>Michelle</b>	It'd be 2.
73		<b>Jeff</b>	It'd be 2. It'd be 2.
74		<b>R1</b>	All right, let's go on.
75		<b>Michelle</b>	If you add, two towers high would be 4 because you have...
76		<b>Jeff</b>	Yeah, I agree with that. Okay. I agree.
77		<b>R1</b>	Okay, but hold on.
78		<b>Michelle</b>	See, but you times that. Two times 2.
79		<b>R1</b>	All right. Write the 4 down. But I don't, can you explain to me [Milin: I know] why from 2 you get to 4. Milin, tell me why.
80		<b>Milin</b>	Because you, for each one of them you could add 1, no 2 more or on because there's a black, I mean a blue and red...
81		<b>Jeff</b>	Yeah, but what she's doing...
82		<b>R1</b>	Shh. Let her finish. Okay.
83		<b>Milin</b>	See for that, you just put one more for red you put a black on top and a red on top, I mean a blue on top instead of a black. And on blue, you put a blue on top and a red on top. You keep on doing that.
84		<b>R1</b>	Do you understand what he's talking about? [Stephanie: Umm-hmm] You all understand what he's talking about? [Jeff: Yeah] All right, so, so we agree 4. What happens if you're building towers 3 high? What did you say it would be?

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85		<b>Milin &amp; Michelle</b>	It would be 8.
86		<b>R1</b>	Write 8 down. Can, can you give me an argument, you don't have to do it, why we jump from 4 to 8?
87		<b>Jeff</b>	That's what I want to know. [Michelle, Milin start talking over each other]
88		<b>R1</b>	That's what Jeff wants to know. So, shh. Go slowly. It's Jeff you're convincing. Not me. Jeff.
89		<b>Michelle</b>	See, see, there's, there's, there's 2 blue. There's 2 here.
90		<b>Jeff</b>	I know that.
91		<b>Michelle</b>	And we went to 4 so it would have to be times $2*2$ . And then $4*2$ would equal 8.
92		<b>R1</b>	That doesn't help Jeff understand. He just knows you're multiplying 2 [Milin: I know. I know. I know.] Okay. One at a time.
93		<b>Jeff</b>	If this was like a pattern, it would go 2-4-6 in between.
94		<b>R1</b>	Yeah, that's what he's saying.
95		<b>Milin</b>	No, no, no!
96		<b>Stephanie</b>	No, but [R1: Okay, one at a time] that's not the pattern that we're working on.
97		<b>R1</b>	Okay, go ahead, Stephanie.
98		<b>Stephanie</b>	The pattern we saw was this: for 1 block at a time we found 2.
99		<b>Jeff</b>	We all ready got 2 and 4 though.
100		<b>Stephanie</b>	I know.

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<b>101</b>		<b>Milin</b>	2-4-6.
<b>102</b>		<b>Stephanie</b>	And then 8. 8, right? Two-4-then 8.
<b>103</b>		<b>R1</b>	But why 8? Jeff wants to know. [Milin: I know!] Go ahead, let, let Milin persuade Jeff.
<b>104</b>		<b>Milin</b>	If you do that, you just have to add for each one of those, you have to add one...
<b>105</b>		<b>R1</b>	Which one of what? These 4?
<b>106</b>		<b>Milin</b>	Yeah. You have to add one more color per...
<b>107</b>		<b>R1</b>	Which way are you adding it? Where are you putting that one more color, Milin?
<b>108</b>		<b>Milin</b>	Two more colors for each one. See.
<b>109</b>		<b>R1</b>	So this one with red on the bottom and blue on the top...
<b>110</b>		<b>Milin</b>	You could put another blue or another red.
<b>111</b>	5:21	<b>R1</b>	Do you agree with that you could put a blue or red on top and that would be...
<b>112</b>		<b>Milin</b>	So that will be 2 and then on this you could do, put another red or a blue on top. That would be 4.
<b>113</b>		<b>Jeff</b>	That's the same right there.
<b>114</b>		<b>R1</b>	No, this is blue-red.
<b>115</b>		<b>Jeff</b>	No, her, look. Look, it's. Okay, okay I see it.
<b>116</b>		<b>Milin</b>	See? Now you see it?
<b>117</b>		<b>R1</b>	Do you find what Milin is saying? [Jeff: Yeah] And down here you could put?
<b>118</b>		<b>Milin</b>	A red or a blue and the same thing with here.

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<b>119</b>		<b>R1</b>	Do you understand that? [Jeff: Yeah] So, do you see how you get 8? Do you agree with that?
<b>120</b>		<b>Michelle</b>	Yeah because, 'cause there's 2 here and then 2 more.
<b>121</b>	5:51	<b>Jeff</b>	No, but, if you're [indecipherable] bound to get a different thing. If you use two colors, you're bound to get a different thing. Do, do another one for blue and she'll all ready have it. She will. Do it.
<b>122</b>		<b>Milin</b>	Do 4. Four that would be 16.
<b>123</b>		<b>Jeff</b>	No. Look, she...
<b>124</b>		<b>R1</b>	Let's get another piece of paper. Would you give me another piece of paper, please? Go ahead Jeff, show me what...
<b>125</b>		<b>Jeff</b>	She, she has 8 blocks with still only 2 colors
<b>126</b>		<b>R1</b>	Eight blocks with 2 colors. Okay, what, let's see this.
<b>127</b>		<b>Jeff</b>	She has like this: red and she kept on alternating. Blue-red-blue-red and she blue-red until she got 8. And then, blue. And then she did the same thing up here.
<b>128</b>		<b>Michelle</b>	I didn't do the same thing on top.
<b>129</b>		<b>Jeff</b>	Yeah, you kept on alternating.
<b>130</b>		<b>R1</b>	Why don't you do that? See what happens. It's what he thought he saw you do, but, that's interesting, maybe you didn't know you were doing that, Michelle. But look, blue-red-blue-red-blue-red-blue-red. He saw you alternating them on the bottom.
<b>131</b>		<b>Jeff</b>	Now, look, you got red and blue.
<b>132</b>		<b>R1</b>	So, so, you're saying that all of these are alternating and these are opposite alternating? Look, this is blue-red-blue-

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			red-blue-red-blue-red.
133		<b>Jeff</b>	You see. This is the same thing up here. Red and blue. Red and blue. See, you have to cross off this one. And now red and blue, red and blue. It's a different way. You have to cross off that one because there's another one all ready there. And then over here, you have that right there.
134		<b>Milin</b>	But, Jeff, Jeff, Jeff.
135		<b>Jeff</b>	But the thing is that's exactly...
136		<b>R1</b>	Listen to Milin.
137		<b>Milin</b>	But that, this is for 3. So you could add 2 for each one of the 3.
138		<b>Jeff</b>	You didn't say that. She was only doing...
139		<b>Michelle</b>	It was supposed to be 3 high.
140		<b>Milin</b>	Yeah, she was doing the bottom ones first. That's why.
141		<b>R1</b>	She wasn't finished. She wasn't crossing them out yet because she hadn't finished the tops. Is that right, Michelle?
142		<b>Michelle</b>	It's 3 high, not 2. See. See how you got 8? There would be 3 high, so there would be...
143		<b>R1</b>	Can you tell me a little bit about how you would get the 8 now from here? Mil...I like Milin was, was helping me a minute ago or someone was helping. I even forget who it was.
144		<b>Milin</b>	You have to keep on putting 2 for this. Two for this. Two for this. And two for this. And it'll work out.
145		<b>R1</b>	Do you agree with that, Jeff?
146		<b>Jeff</b>	Yes.

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147		<b>R1</b>	Okay. So.
148		<b>Milin</b>	Because you can't. There's only two colors. You can't put anymore on them.
149		<b>R1</b>	Okay, now imagine we have our 8. Where, where do we go from 8? Because I heard, Michelle say 12.
150		<b>Milin</b>	Sixteen.
151		<b>R1</b>	Well, what is it? Stephanie?
152		<b>Jeff</b>	I, I still want to see you build 3 up and then see if there's any...
153		<b>R1</b>	Okay, Jeff isn't convinced you have the 8 here, so you were going to fast.
154		<b>Milin</b>	Using Unifix cubes you could still...
155		<b>Jeff</b>	It doesn't matter. It's just easier to draw it. [Michelle draws]
156		<b>Stephanie</b>	I know.
157		<b>Blonde teacher</b>	Milin, why don't you draw what you think?
158		<b>Milin</b>	Okay. [Draws]
159		<b>Jeff</b>	You got that and that's the same as that. Blue-blue-red. Blue-blue. [Milin: No, look, look...] No, that's red.
160		<b>R1</b>	Red-blue-red.
161		<b>Jeff</b>	Yeah.
162		<b>R1</b>	Any ideas Stephanie how to show from 4 to 8?
163		<b>Stephanie</b>	I do. All right.
164	~9:50	<b>R1</b>	How about you, Jeff? Before, Milin said you understood

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			when he got 4.
<b>165</b>		<b>Jeff</b>	I understand that, but...
<b>166</b>		<b>R1</b>	Okay, now, if this is what he got for 4 and if you understood what he just talked about, can you write down these 4, and use his idea to see if you could build 8? Why don't you write these down what he has here. These 4. Start with these 4 because that's what Milin said to start with. These 4.
<b>167</b>	10:24	<b>Jeff</b>	And then...
<b>168</b>		<b>R1</b>	You're going to run out of space if you're going to build them up.
<b>169</b>		<b>Jeff</b>	I'll go down.
<b>170</b>		<b>R1</b>	Okay, that's fine. Does it matter?
<b>171</b>		<b>Jeff</b>	No.
<b>172</b>		<b>R1</b>	Okay, now, what was his idea?
<b>173</b>		<b>Jeff</b>	I put too many things of red. You've got 2 reds. Two blues and the opposite. Then you're adding onto one to make this blue. And then you have to...
<b>174</b>		<b>R1</b>	But hold on. He said. That's not what Milin said.
<b>175</b>		<b>Jeff</b>	What did he say?
<b>176</b>		<b>R1</b>	Let's wait 'til he's finished thinking a minute and ask him because I think that's the key to it to know what Milin said and to see if that makes sense.
<b>177</b>		<b>Milin</b>	The thing is that you have to keep on adding 2.
<b>178</b>		<b>R1</b>	Okay, Milin, let's talk about this one. He had this, right?
<b>179</b>		<b>Milin</b>	Okay, then you just...

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<b>180</b>		<b>R1</b>	Now, he said from here, add a blue. Is that what you said?
<b>181</b>		<b>Milin</b>	Yeah, you have to keep on adding to the top.
<b>182</b>		<b>Jeff</b>	It doesn't matter.
<b>183</b>		<b>R1</b>	No, he wants to add on the bottom.
<b>184</b>		<b>Milin</b>	You see for this, see, you have, have to have the bottom down here because you can't put the top otherwise it'll be different.
<b>185</b>		<b>R1</b>	Okay. But, he put a bottom "B" here.
<b>186</b>		<b>Jeff</b>	It would be the same. See, if you put a "b" up there, it'd be the same just as if you put on there. It'd be blue-blue-red. And then if you crossed that off, it'd be, put a "b" up there, it'd be blue-blue-red. Just like before.
<b>187</b>		<b>Stephanie</b>	Yeah, but, Jeff, Jeff.
<b>188</b>		<b>R1</b>	Okay, but...Hold on.
<b>189</b>		<b>Michelle</b>	If you look at this, you have it...
<b>190</b>		<b>R1</b>	Time out for a minute. I'm getting very confused because all of you are talking and you have all different ideas, and I think it would help me if we got one idea on the table at a time. Now the one idea that we have on the table that I wish we would explore before we hear all the new ideas is this one here. Now, I would like all of you to consider what Milin said here. Do you all see that? Get another piece of paper and write this down. Maybe write in the middle so we could build them both ways, and see if there's a difference. You don't have to cross off what you did. Now, what you have here, in this space is on the bottom red-blue-red-blue. And on the top you have blue-red-red-blue.
<b>191</b>		<b>Milin</b>	See, if you put this right...

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<b>192</b>		<b>R1</b>	<p>But hold on a minute. Let everyone get this down. You might want to separate them, too. Might be a good idea to do it just the way Milin or Michelle wrote it. I only want to see 4 down there because we're looking at Milin's strategy. That's not what Milin did. You made a chart. Milin didn't do that. I'm interested in [Stephanie: Oh]. Okay. Milin actually drew pictures or Michelle drew these pictures. Right? Did you draw this, Michelle, or Milin? You draw pictures of what these towers are going to look like. And see that's not really quite the same. That's interesting.</p>
<b>193</b>		<b>Jeff</b>	<p>But that's what we did. That's what she did. She did...</p>
<b>194</b>		<b>Milin</b>	<p>So you could do it anyway but, see, they're just put together.</p>
<b>195</b>		<b>R1</b>	<p>Now, what I think Milin is asking us all to do is, is to imagine in front of us, can you all see in front of you the towers of 2 that are these colors? Can you all imagine that in your mind? Can you see the first one? Red on the bottom? Blue on top? Do you see that in your mind, in the middle of the table there? Can you see it? The other one blue on the bottom, red on the top. I see these 4 towers. Now Milin is calling our attention to this first tower. Right? Red on the bottom and blue on the top. And what is he asking us to do with it?</p>
<b>196</b>		<b>Milin</b>	<p>Put another blue and then make another thing exactly...</p>
<b>197</b>		<b>R1</b>	<p>Right, put another blue. Now, can you draw a picture of what that tower will look like of 3. This is a tower of 3. He's putting another blue. Now, he chooses to put it on the top or bottom, Milin? Next question we'll ask of you.</p>
<b>198</b>		<b>Milin</b>	<p>[Draws from top B-R-B tower] See, you put a blue here or you could put a red there and this one, [draws from top R-R-B] you could put this way. You could put a red instead of the blue.</p>

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<b>199</b>		<b>R1</b>	Okay, Milin, can you show us in the middle here what you just did with that one tower? Thank you.
<b>200</b>		<b>Milin</b>	See, from this towers, right,
<b>201</b>		<b>R1</b>	From, from this one tower?
<b>202</b>		<b>Milin</b>	See, so I put the blue here, the red here on top of it so it's like this. And then I added one more. That would be red. But then I did like this: blue. Then I put the red back on top of it. Then I put a blue because there's only 2 colors, and I all ready...
<b>203</b>		<b>R1</b>	So what you're, what you're telling me here if I could, if I could make my picture, if I were doing what Milin asked me to do, where we had a blue and red, what he's telling me to do is he's saying from this tower, I'm going to put a blue on the top.
<b>204</b>	15:06	<b>Milin</b>	Or red.
<b>205</b>		<b>R1</b>	Or from this tower, I'm going to put a red on the top. [Milin: Yeah] Is that what you're telling me to do? So from this tower, we get these two? [Milin: Yeah] Is that what...
<b>206</b>		<b>Milin</b>	Yeah, and for each one you keep on doing that and for 6 you get 64.
<b>207</b>		<b>R1</b>	Does that make any sense? [Jeff: Yeah]
<b>208</b>		<b>Milin</b>	[Camera shows paper squares B-B-R in left column, RBR BR in right column] It followed a pattern to 5, why can't it follow a pattern to 6?
<b>209</b>		<b>R1</b>	I guess what, what I'm confused about, Jeff, is you took this one with blue and red and you only put a blue on the top. And you've only done, you've only made this one. Milin is telling you could also make this one. That you could've

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			put...
210		<b>Jeff</b>	But I made that.
211		<b>R1</b>	Where is that? Red on the bottom, blue...
212		<b>Jeff</b>	Red.
213		<b>R1</b>	From this one, you could've put two things on the top. You only put one. From this one, you could....
214		<b>Jeff</b>	Okay, I understand.
215		<b>R1</b>	Does that make sense what he's talking about? And he's saying so from these 4...
216		<b>Milin</b>	You could make 8.
217		<b>R1</b>	So tell me now, convince Jeff why it's going to be 8 – why it's going to be double.
218		<b>Jeff</b>	Convinced?
219		<b>Michelle</b>	I all ready figured it out with this.
220		<b>R1</b>	And what's different about the way you did it, Michelle?
221		<b>Michelle</b>	I just, I just, I didn't do it the way Milin did it. I just made them out and I didn't find any that weren't the same.
222		<b>R1</b>	That's not what Milin did. He did something very different. How about you, Steph?
223		<b>Stephanie</b>	I found it like this. I drew my lines. And then I went red-red-red, blue-blue-blue, blue-red-blue, red-blue-blue, blue-blue-red, red-red-blue, red-blue-red, blue-red-red.
224		<b>R1</b>	Is yours different than the way Milin did it?
225		<b>Milin</b>	Yes.

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226		<b>Stephanie</b>	Well, yes
227		<b>R1</b>	In what way?
228		<b>Stephanie</b>	He built his towers up like this. He went red, blue, red, blue, red, blue, and so on.
229		<b>R1</b>	I didn't see him do that.
230		<b>Stephanie</b>	Michelle did it like that.
231		<b>R1</b>	That's not what he did. He started with red and blue. Right? And from this red...
232		<b>Milin</b>	I put a red.
233		<b>Stephanie</b>	He put like...
234		<b>R1</b>	He put a red on top.
235		<b>Milin</b>	And a blue one that's like.
236		<b>R1</b>	You put a red on top. And a blue on top. So we've got blue, red, red, red. And from the blue...
237		<b>Milin</b>	I did the same thing.
238		<b>R1</b>	A red on top. That's how he got his red-blue. And then he put a blue on top and got blue-blue.
239		<b>Stephanie</b>	But that's like what he's like, that's what's different from mine. I just like took the things and went like, I just took one and went...
240		<b>Milin</b>	And kept on going
241		<b>Stephanie</b>	Here's one red-red-red, blue-blue-blue. And then I'd go like red-blue-blue, b-r-b.
242		<b>R1</b>	So what I'm hearing you say is that you're just you [Milin: Guessing] believe this 8, but you say guessing. Why does

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			that sound like guessing?
243		<b>Milin</b>	Because what if you could make more?
244		<b>Stephanie</b>	Okay, this is the 3 high, right? And you're convinced you could make 8. I'm convinced I could make 8.
245		<b>R1</b>	Yeah, but you haven't, he's proved to me from the 4, you could only make 8. You could get two from this one, and two from this one, and two from this one, and two from this one.
246		<b>Milin</b>	But could you convince her?
247		<b>Stephanie</b>	Michelle? Him?
248		<b>Milin</b>	No, her.
249		<b>Stephanie</b>	Her?
250		<b>Milin</b>	Yeah.
251		<b>Stephanie</b>	All right. I've done this before. Okay.
252		<b>R1</b>	Take another piece of paper if you want to because it sounds like your approach is a little different.
253		<b>Stephanie</b>	Okay.
254		<b>R1</b>	You gotta convince me there are 8 and only 8. No more or fewer.
255		<b>Milin</b>	Whoa. You do draw big.
256		<b>R1</b>	Now, now Jeff, this is, this might be a little different here. Let's see what's going on here.
257		<b>Stephanie</b>	Okay, first you have without any blue. With just red. R-R-R.
258		<b>R1</b>	Okay, no blues.

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259		<b>Stephanie</b>	Then you have with one blue.
260		<b>R1</b>	Okay.
261		<b>Stephanie</b>	B-R-R. Or R-B-R. Or R-R-B.
262		<b>R1</b>	Anything else?
263		<b>Michelle</b>	And you would do the same pattern for everything else?
264		<b>Stephanie</b>	No, not with the blue. Not with one blue.
265		<b>Michelle</b>	You would, you would do it with the one red and two blues...
266		<b>Jeff</b>	You would alternate like...
267		<b>Michelle</b>	You would do it the other way around.
268		<b>R1</b>	That's not what she said. Let her finish. That's what you would do. Let's hear what Stephanie does. Maybe she's not the same.
269		<b>Stephanie</b>	Well, there's no more of these because if you had to go down the other one, you'd have to have another [indecipherable]. But okay.
270		<b>R1</b>	You buy that? That's all there is of those? [Yeah] Okay.
271		<b>Stephanie</b>	Then you have with 3 blues. Well, no, not with 3 blues. I'll go like that.
272		<b>R1</b>	You have no blues and now you have exactly one blue.
273		<b>Stephanie</b>	Okay. Now you have exactly 2 blues. Wait, wait, actually, yeah, that's what I did last time because I did it back with 2 things.
274	20:08	<b>R1</b>	Okay, let's see that.

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275		<b>Milin</b>	Then with 3 blues!
276		<b>Stephanie</b>	Which is...
277		<b>Milin</b>	Then you get every single one.
278		<b>Stephanie</b>	You could put B-B-R. You could put R-B-B.
279	20:26	<b>Milin</b>	You could put B-R-B. You could put...
280		<b>Stephanie</b>	Yeah, but that's not what I'm doing. I'm doing it so that they're stuck together.
281		<b>Jeff</b>	There should be one with one red. Then you could make it up and then there's one with two reds, and there's one with 3 reds.
282		<b>Milin</b>	Ahh, but see you did the same thing, but there's blue...
283		<b>Jeff</b>	There's all reds. And then there's 3 reds, 2 reds. There should be one with one red. And then you change it to blue.
284		<b>Stephanie</b>	Well, that's not how I do it.
285		<b>R1</b>	Let's hear how, how Steph...we'll hear, we'll hear that other way. That's interesting. Okay, now, so what you've done so far is...
286		<b>Stephanie</b>	One blue. Two blue.
287		<b>R1</b>	Okay. No blues.
288		<b>Stephanie</b>	One blue. Two blue.
289		<b>R1</b>	One blue and two blues. But Milin just said you don't have all two blues, and you said, that's, why is that?
290		<b>Stephanie</b>	[Hands paper to Milin] Okay show me another 2 blue? With them stuck together because that's what I'm doing it.

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<b>291</b>		<b>Milin</b>	In that case [Hands back paper]
<b>292</b>		<b>R1</b>	Okay, now what are you doing, Stephanie?
<b>293</b>		<b>Michelle</b>	But, but if you just had 2 blues and they weren't stuck together, you could...
<b>294</b>		<b>Stephanie</b>	But that's what I'm doing, I'm doing the blues stuck together.
<b>295</b>		<b>R1</b>	Okay.
<b>296</b>		<b>Stephanie</b>	Then we had 3 blues that you could only make one of. Then you want 2 blues stuck apart, not stuck apart, took apart.
<b>297</b>		<b>R1</b>	Separated?
<b>298</b>		<b>Stephanie</b>	Yeah, separated. And you can go blue, red, red - do I have that? No. Blue.
<b>299</b>		<b>R1</b>	Okay, so Milin wanted to stick that in earlier, I thought and Michelle, right? When you were doing 2 blues? You wanted that stuck...
<b>300</b>		<b>Milin</b>	Because see, look at this. For 2 reds and one blue. Two reds...
<b>301</b>		<b>Michelle</b>	And that's stuck together here for 2 reds.
<b>302</b>		<b>Milin</b>	Yeah, so you're following no pattern.
<b>303</b>		<b>Michelle</b>	And you have more stuck together here.
<b>304</b>		<b>Stephanie</b>	Well, you're following your pattern. But my pattern goes no red, one red. This was not meant to be like that. That's not. It's in the category of one blue. That. I could stick that some place in another category. But I want this to be in the category of one blue. Not in the category of the opposite of this one. And then I have this one, the red-red-blue. So to you, that, you might put that way at the end of the line. But I

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			put it right here.
<b>305</b>		<b>Jeff</b>	I have a question. Do you have to make a pattern?
<b>306</b>		<b>Milin &amp; Stephanie</b>	No.
<b>307</b>		<b>Jeff</b>	Well then why is everybody going by a pattern?
<b>308</b>		<b>Milin</b>	Because we liked it.
<b>309</b>		<b>Stephanie</b>	Yeah, it's easier.
<b>310</b>		<b>Michelle</b>	It's easier...
<b>311</b>		<b>Stephanie</b>	Because it's easier than just going ooh-ooh.
<b>312</b>		<b>Michelle</b>	Because if you, because if you, because if you just keep on guessing like that, you're not sure if there's going to be more.
<b>313</b>	~23	<b>Stephanie</b>	It's easier maybe like Shelly and Milin's pattern was to go put this in a different category...
<b>314</b>		<b>Jeff</b>	I know their patterns.
<b>315</b>		<b>Stephanie</b>	Okay, but what I'm saying is that it's, that it's just easier to work with a pattern.
<b>316</b>		<b>Milin</b>	Oh here's another one! Let's see...
<b>317</b>		<b>Stephanie</b>	Yeah, I'll put that in.
<b>318</b>		<b>Michelle</b>	Because you might have a duplicate. And, and you may not know.
<b>319</b>		<b>Stephanie</b>	It's harder to check. It's harder to check just having them like come up from out of the blue.
<b>320</b>		<b>Milin</b>	Then just going like this and getting 2 from...

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321		<b>Jeff</b>	How do you know there's different things in the pattern?
322		<b>Milin</b>	Since, see, look at this. These are all different, right?
323		<b>Jeff</b>	I see that. Yeah.
324		<b>Milin</b>	Yeah, see? From this, right, you can make two more so because here there's a blue-red and then a blue, red...
325		<b>Michelle</b>	Because, because there's only 2 colors more so you know you can't make more. Yeah, so.
326		<b>Milin</b>	And then there's red, I mean blue-red-red. And you can't make anymore on this one so you go onto the next one.
327		<b>Stephanie</b>	All right, and then...
328		<b>Jeff</b>	How do you know you can't make any more from that?
329		<b>Stephanie</b>	Because...
330		<b>Milin</b>	Because there's not any more color.
331		<b>Stephanie</b>	Look. Okay. Start here. Start here. Okay? You have the 3 together? The one 1 blue. You have the 1 blue. How could I build another one blue?
332		<b>Jeff</b>	You, you can't.
333		<b>Stephanie</b>	All right. So I've convinced you that there's no more 1 blue. All right.
334		<b>Michelle</b>	But if you didn't have that pattern, it would be harder to convince you.
335		<b>Stephanie</b>	If I went, I'll put this one blue over here. And that blue will it'll be on another piece of paper. However that goes.
336		<b>Jeff</b>	Yeah, but you can make a blue different what...if you go like this.

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337		<b>Michelle</b>	That's if you have 4.
338		<b>Jeff</b>	If you go like this. You can go r-r-b or you can go b-r-r. Red...
339		<b>Stephanie</b>	That's what I have. No.
340		<b>Jeff</b>	No. They're all, they're all different. You can do...
341		<b>Stephanie</b>	What I'm saying is this is 1 blue. This is one blue.
342		<b>Jeff</b>	Yeah but there's 2 more different with one blue.
343		<b>Stephanie</b>	Yeah. There is...
344	25:07	<b>Milin</b>	No, but only on the bottom.
345		<b>Stephanie</b>	Look, but I have those three. Look. B-r-r, r-b-r, r-r-b, but then how am I supposed to make another one once that blue got down to my last block?
346		<b>Jeff</b>	Okay.
347		<b>Stephanie</b>	Okay. So I've convinced you there's no more 1 blue? [Jeff: Yeah] All right, now.
348		<b>Michelle</b>	Then you have to go to 2 blue.
349		<b>Stephanie</b>	Two blue. Here's one, right? 2 blue. We have one, b-b-r, then we have r-b-b. How am I supposed to make another one?
350		<b>Jeff</b>	B-r-b.
351		<b>Stephanie</b>	No, this is the other. Milin gave me that same argument.
352		<b>Michelle</b>	She means, she means together.
353		<b>Jeff</b>	But the thing is it doesn't matter...
354		<b>Stephanie</b>	I don't...

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355		<b>Michelle</b>	No, she means stuck together.
356		<b>Stephanie</b>	Stuck together, that means, like okay I took...
357		<b>Jeff</b>	I know.
358		<b>Stephanie</b>	Okay, so can I make any more of that kind?
359		<b>Michelle</b>	Then you have to move to three, which you can only make 1.
360		<b>Stephanie</b>	Yeah, you can only make 1 and then you could make the 3, without blue, and where there's 3 red.
361		<b>Michelle</b>	Then you can make 2 split apart.
362		<b>Stephanie</b>	Two split apart, which you can only make 1 of. And then you could make, you could find the opposites right in the same group. [Jeff: Okay] All right, so then I've convinced you that there's only 8?
363		<b>Jeff</b>	Yeah. [Stephanie: Yes!]
364		<b>R1</b>	How many if you're making towers of 4?
365		<b>Michelle, Milin, Stephanie</b>	16
366		<b>R1</b>	You agree, Jeff?
367		<b>Jeff</b>	Yeah.
368		<b>Michelle</b>	Because you have...
369		<b>R1</b>	Jeff, why do you agree? Don't let them go by so easily. This could be pressure here.
370		<b>Michelle</b>	See, look it's because, say you add a red or a blue, you can add a red or blue here.

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371		<b>R1</b>	Make a drawing for your sentence showing it..
372		<b>Jeff</b>	I understand because you can only, you could put...
373		<b>Michelle</b>	Put 2 colors here, you could put 2 colors there.  You can keep on going.
374		<b>Jeff</b>	You can keep doing 2 colors for each one, and that's...
375		<b>Michelle &amp; Jeff</b>	2-4-6-8-10-12-14-16.
376		<b>R1</b>	And so that's for towers of...
377		<b>Jeff</b>	4
378		<b>Milin</b>	My guess is 16, but...
379		<b>Jeff</b>	We all ready got 16.
380		<b>Milin</b>	Why, why did she say in the beginning of the whole thing that 12
381		<b>Jeff</b>	This...
382		<b>Michelle</b>	It's, it's like, it's like...
383		<b>R1</b>	Why did you say 12, Michelle?
384		<b>Jeff</b>	Listen, you could do a red or a blue. You could do either a red or a blue. A red or a blue.
385		<b>Milin</b>	Jeff, Jeff, Jeff. I know that [indecipherable] But I want to know why she said 12 before?
386		<b>Stephanie</b>	Yeah, Michelle, why did you?
387	27:11	<b>Jeff</b>	Because she was guessing, not making patterns.
388		<b>R1</b>	Is that true, Michelle? Poor Michelle, it's okay. You think 12 or 16, Michelle?

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<b>389</b>		<b>Michelle</b>	16.
<b>390</b>		<b>R1</b>	Michelle thinks 16. Now, now you made towers of 5 in class, and what did you get?
<b>391</b>		<b>Milin, Michelle, Stephanie</b>	32
<b>392</b>		<b>R1</b>	Does that work the same way?
<b>393</b>		<b>Milin, Michelle, Stephanie</b>	Yeah.
<b>394</b>		<b>Milin</b>	If you get towers of 4
<b>395</b>		<b>Jeff</b>	They're multiples of 2.
<b>396</b>		<b>Stephanie</b>	The hard part is making patterns. Like, you, from now, we know how to just oh you could give us a problem, like how many in 10 and we'd know.
<b>397</b>		<b>R1</b>	Okay, how many in 10? You know the answer?
<b>398</b>		<b>Stephanie</b>	I know the answer. I figured it out. It's 1,024.
<b>399</b>		<b>R1</b>	1,024.
<b>400</b>		<b>R2</b>	Are you sure?
<b>401</b>		<b>Stephanie</b>	Uh-huh.
<b>402</b>		<b>Jeff</b>	Don't try to convince me.
<b>403</b>		<b>R1</b>	Try to convince him.
<b>404</b>		<b>Milin, Michelle</b>	No! No!
<b>405</b>		<b>Milin</b>	Okay, okay, okay

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406		<b>Stephanie</b>	I think we have 1,000 units.
407		<b>R1</b>	You could do that later. However, you were saying you know the answer, but...
408		<b>Stephanie</b>	But the problem is, the hard part is you could just give us a problem and we could go like well, we'll go $22 \times 2$ ...
409		<b>Michelle</b>	See for how we're doing you keep on adding what you have all ready. For here, you add 2 more. For here, you add another 4 so for here and for the 16
410		<b>Jeff</b>	You sure it's 1000? You sure?
411		<b>Stephanie</b>	Yeah.
412		<b>Jeff</b>	Because look you have...
413		<b>Stephanie</b>	Now, see you're dividing the...
414		<b>Jeff</b>	I'm not dividing...
415		<b>Stephanie</b>	The problem. You're timesing, no you don't times it. It's the same thing I did. I counted ahead. I just counted ahead 5 or 6, and I said oh, I could just multiply it by that and that'll give me the same answer, but it didn't work.
416		<b>Jeff</b>	Okay. It didn't work.
417		<b>Stephanie</b>	Okay. You have to figure out what's in between that.
418		<b>R2</b>	What did you find then?
419		<b>Teacher</b>	What do you mean?
420		<b>Stephanie</b>	In between, okay.
421		<b>R2</b>	Show me a little bit
422		<b>Stephanie</b>	Do you want me to figure out 10, right? But, in order to figure out 10, I was only up to 5. So what I had to do was I

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			had to go and I had to say, well, what's 6, what's 7, what's 8, and what's 9, and times that times the last number I had.
423		<b>R1</b>	Well, let's, let's take a look at what you had here. This, this is what Stephanie had, guys. If you want to do it yourself for a minute. When I asked Stephanie how many for towers of 10, what Stephanie, why don't you say what you did to get 1,024 and then let's talk about this...
424		<b>Milin</b>	Yup, she's right.
425	~29:20		[indecipherable]
426		<b>Stephanie</b>	I was up to #5 so I took the #6. I was up to #6.
427		<b>R1</b>	64 is... Why don't you write that? Okay. Towers of 6.
428		<b>Stephanie</b>	Okay, now I was up to #6.
429		<b>R1</b>	You agree with that?
430		<b>Jeff</b>	Yeah
431		<b>Stephanie</b>	So I multiplied, I tried, first of all, I tried multiplying it times 8 because I figured well, all I have to do was 6+4 times 2 that's 8 so 64 times 8.
432		<b>Jeff</b>	What are you saying?
433		<b>Milin</b>	She did it wrong.
434		<b>R1</b>	No, no, no, let's hear what she's saying. Let's hear her thinking.
435		<b>Stephanie</b>	First, I thought, well, I don't want to go ahead, and I don't want to have to multiply 7, 8, 9, and 10. 7, 8, 9 before I get 10. So I figured 6+4 equals 10. And since I'm timesing times 2, I'll multiply 4*2 to get 8 and then just multiply 64*8.

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436		<b>Michelle</b>	But she was wrong.
437		<b>Stephanie</b>	Yeah.
438		<b>Michelle</b>	And then, and then, no, she was right here. She only timesed it by 2 so she was right.
439		<b>Stephanie</b>	Then I did...
440		<b>Milin</b>	You keep timesing it by 2
441		<b>Stephanie</b>	Then I did $128 \times 2$ . 256, 512, and then...
442	30:29	<b>Milin</b>	You get your answer.
443		<b>R1</b>	Except that, this is where I'm very, very interested what she did. How come she got something, she got 512...
444		<b>Jeff</b>	And you all ready got 512 over there.
445		<b>R1</b>	So Is that so very wrong?
446		<b>Jeff</b>	And then you could've timesed this by 2...
447		<b>Milin</b>	No, that's the same thing.
448		<b>Jeff</b>	But you could've just timesed this by 2 and you would've had it a lot easier than going, times, times, times.
449		<b>R1</b>	So in other words, could this have worked, that's my question. Now, when would this work? Why didn't the 8 work? Why did you have to keep...
450		<b>Stephanie</b>	Ahh, I just thought of something. I'm wondering if this will work. This 8 is #8, okay? This is #8, right? This is the answer to #8.
451		<b>Jeff</b>	You had it right, you just didn't follow a pattern, you just took a guess. And then if you filled it out exactly.

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452		<b>R1</b>	Okay. So what you're suggesting is multiplying by 8 didn't work. It gave you 512, which was...
453		<b>Jeff</b>	Which gave you to #8.
454		<b>R1</b>	To #9, to #8? Or to #9?
455		<b>Jeff</b>	So, if you...
456		<b>Michelle</b>	This pattern works here.
457		<b>R1</b>	If I plugged in #8 or #9...
458		<b>Milin</b>	It would've worked, her pattern would've...
459		<b>R1</b>	Let's get another piece of paper and see what happened here because this is just a mess.
460		<b>Milin</b>	It would've worked where, but then she has to [R1: Get me another piece of paper. Let's start again.] to times it by 2 after she gets her number. She has to times it by 2 after she gets her number.
461		<b>R1</b>	But, you know what I'm thinking, I'm thinking maybe what we should do is I want you to, I don't want to throw away Stephanie's idea here, okay, because what Stephanie has here in her idea, once she got to towers of 9, right, she said there were 512. That's by each time multiplying it by 2.
462		<b>Michelle</b>	And then you have to move [R1: But, hold on a minute] [indcipherable] This would work if you multiply it times 2. You still get 1024 like over here.
463		<b>R1</b>	Right, but why, why didn't multiplying by 8 work when she had towers of 6?
464		<b>Michelle</b>	Because, because she wasn't so sure about going like this...
465		<b>R1</b>	Okay, but why, how could she be sure? In other words if 8 didn't work, do you understand my, my challenge to you?

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			[Yeah] All you mathematicians here. My challenge to you is I don't want to throw out this idea because, you know, because if Stephanie has something here, she'll save you a lot of work in the future, right? If she has a good idea here? Do you understand the problem here? And I think what we'll do, I want to be sure. I don't know if Mrs. Barnes is gone. I want to be sure your teacher understands what's going on here so to sort of push you to think about this so that next time I come, maybe you could invent another way. If I said towers of...
466		<b>Michelle</b>	80
467		<b>R1</b>	80. Now, and I said I'll give you a calculator, but you have to know what to do with your calculator, right?
468		<b>Stephanie</b>	There's a problem because you have to go all the way from 10 to 80.
469		<b>R1</b>	Well, my question is let's not worry about that big problem for a moment. Let's try to do it with a simple problem. Suppose you didn't know towers of 6 were 64 and towers of 7 were, what did you say that was? What do you have there?
470		<b>Milin</b>	Towers of 7...
471		<b>R1</b>	128? Is that what you have, Milin?
472		<b>Milin</b>	Yeah, I think.
473		<b>R1</b>	And so. Suppose you didn't know that. How could you jump from towers of 6 to towers of 10 without going through all those steps and why?
474		<b>Milin</b>	Get out.
475		<b>R1</b>	But isn't that a nice, challenging question? I have one more question to get to. I'm going to put this one aside for a minute because that's going to take some time. When we

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			come back, then we'll talk about it. You could bring your calculator, Jeff. Fair enough? Okay, now look. You said this was like shirts and pants, and I would like for you to say if you agree it's like shirts and pants...
476		<b>Jeff</b>	I agree.
477		<b>R1</b>	But why?
478		<b>Michelle</b>	But if you kept on going up, you would have to add...
479		<b>R1</b>	Okay, one at a time. Let's hear Jeff.
480		<b>Jeff</b>	You have the same pattern, same pattern
481		<b>R1</b>	In what way?
482		<b>Jeff</b>	Because with shirts you have to keep on alternating the shirts with the pants. And keep on alternating pants with the shirts...
483		<b>R1</b>	I'm not so sure I follow what you're saying.
484		<b>Jeff</b>	Neither do I.
485		<b>R1</b>	Stephanie is working on the towers of 10.
486		<b>Stephanie</b>	I might have it here. I'm thinking if I multiply the last number I got which was 1,024 times 80, that I got, [Michelle: You would get the answer probably] 81,120, but I'm not sure if I'm right or not. You know, I'd have to go through all that...
487		<b>Michelle</b>	Nuh-uh.
488		<b>Milin</b>	Nuh-uh.
489		<b>Michelle</b>	Or maybe you would multiply it by 70 because you all ready go 10.

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490		<b>Milin</b>	No, but times it by 8 [Jeff: You guys are losing me here] because you have to have 8 more.
491		<b>R1</b>	Me too, I'm lost too.
492		<b>Stephanie</b>	You wouldn't times it by 8 because we timesed it by 8 when we were on 8. We times it by 80 when we're on 80.
493		<b>Jeff</b>	True.
494		<b>R1</b>	But when, I don't understand. Hold on.
495	35:00	<b>Milin</b>	Nuh-uh. Did you times it by 80 when you were on 80?
496		<b>Stephanie</b>	I went, I said well, there was ...
497		<b>Milin</b>	8*8. 64. How could that be?
498		<b>Stephanie</b>	Actually, you would multiply it by 1,600.
499		<b>R1</b>	Can, can we call time out for a minute?
500		<b>Jeff</b>	What are you guys talking about?
501		<b>R1</b>	Yeah, I'm a little lost and Jeff is lost. And I don't know how Michelle is doing here. And you two can continue this when we leave and work this out. However...
502		<b>Michelle</b>	Finish your fight.
503		<b>R1</b>	I don't really want you to really solve the problem for towers of 80. I want you to solve the problem of towers of 10.
504		<b>All</b>	We did that.
505		<b>R1</b>	But hold on, you have to pretend, you only know the answer for towers of 6.
506		<b>Michelle</b>	Just keep on building.

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507		<b>R1</b>	That's one way.
508		<b>Milin</b>	I all ready did that. I all ready did that.
509		<b>Stephanie</b>	You want us to try and figure it out the way I tried to figure it out the first time.
510		<b>R1</b>	Right with only multiplying by 1 number. And convince me that that number makes sense to multiply by. Does that make sense? Do you understand?
511		<b>Milin</b>	This [holding up his work]...
512		<b>Jeff</b>	But all you did...
513		<b>R1</b>	Okay. Hold on. Time out.
514		<b>Jeff</b>	You didn't know times 2 times 2 would help you.
515		<b>Milin</b>	I did.
516		<b>R1</b>	Well, you sort of know it. But I want to save all those intermediate steps because if you had to go to, to build towers of 80, let's see, when you had to build towers of, 2 of 2, how many times, of 3 high, how many times did you multiply by 2?
517		<b>Milin</b>	She's right, Jeff. You should really multiply by 8(?).
518		<b>R1</b>	When you had to build towers of 3, how many times did you need to multiply by 2?
519		<b>Milin</b>	Times 3. 4 times 2.
520		<b>R1</b>	I said by 2.
521		<b>Milin</b>	Oh. 4. Same thing.
522		<b>R1</b>	Okay, $2*2$ . That's one time you multiply it by 2. You got 4. Then you multiply by 2 again...

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523		<b>Milin</b>	8
524		<b>R1</b>	And that gave you 8. So how many times did you multiply by 2?
525		<b>Stephanie</b>	You multiplied the amount of times you...
526		<b>R1</b>	Well, twice. You multiplied it once. This is $2*2$ once, right? And then you multiplied it by 2 again, right? $2*2$ , let me write this. $2*2$ gave you 4. That was one time. Then you multiplied it by 2 again another time and you got 8. So you multiplied it twice to build towers of 3, is that right?
527		<b>Jeff</b>	Yeah.
528		<b>Milin</b>	No.
529		<b>R1</b>	No?
530		<b>Milin</b>	Because to get towers of 2, then it will be much easier.
531		<b>Jeff</b>	Yeah, but the thing is it's right, it's easier...
532		<b>R1</b>	I think we've run out of time.
533		<b>Jeff</b>	Yeah, we did.
534		<b>R1</b>	Will you come back?
535		<b>All</b>	Yeah, okay.
536		<b>R1</b>	Okay. Would you come back? Would you come back another time? Can we come back another time? [Yeah] Okay, next question is I want to know what this has to do with shirts and pants.
537		<b>Milin</b>	Shirts and pants?
538		<b>Stephanie</b>	No.

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539		<b>Jeff</b>	Oh no. I have no idea. I didn't think of it...
540		<b>R1</b>	You can talk about it before and share it.
541		<b>Stephanie</b>	Can I tell you what I told you last time I was here about shirts and pants?
542		<b>R1</b>	What, what?
543		<b>Stephanie</b>	Because remember, it was the problem with the shirts, the pants. You had to match up Steven's pants with the shirts to make like a tower...
544		<b>R1</b>	Yeah.
545		<b>Stephanie</b>	Remember?
546		<b>Milin</b>	He has to have at least big hands.
547		<b>R1</b>	Well thank you. This was great. Well, thank you so very much. This was fun. I love coming to talk to you about math.
548		<b>Milin</b>	Thank you.
549		<b>R1</b>	My budding mathematicians here.