

Description: Clip 4: Justifying the Isomorphism Parent Tape: Pizza Problems with Four and Five Toppings Date: 1999-03-01 Location: David Brearley High School Researcher(s): Professor Carolyn Maher	Transcriber(s): Marcelle Farhat, Elijah Brookes, Gary Wenger, Anat Even-Zahav Verifier(s): William McGowan Date Transcribed: Fall 2010 Page: 1 of 5
---	--

Line	Time	Speaker	Transcript	Code
1		Stephanie	Ok, so this becomes, if this becomes a pizza with one topping, for this row, right? Then this becomes a pizza with two toppings (with Shelly), and three two-toppings plus three two-toppings equals six two-toppings.	
2		Shelly	Yeah.	
3		Stephanie	That's what, if we were explaining it how,	
4		Shelly	Yeah	
5		Stephanie	and then this is one pizza with everything. Right?	
6		Shelly	But then that would become one pizza with two toppings, right?	
7		Stephanie	No, one pizza with three toppings.	
8		Shelly	No, yeah.	
9		Stephanie	And this would become three pizzas with three toppings. For this row.	
10		Shelly	Yeah	
11		Stephanie	Right?	
12		Shelly	I think so.	
13		Stephanie	To get four pizzas with three toppings.	
14	5:31	Shelly	Yeah, so that would become one, or, that would become three toppings.	
15		Stephanie	Yeah, that's what I said.	
16		Shelly	Ok.	
17		Teacher/ researcher	So what did you just say there? Does that thing I suggested sort of work for this too?	
18		Stephanie	Uh-huh.	
19		Teacher/ researcher	So tell me what it means here. Because now when you went to... This has three toppings then it becomes four toppings. What happened there?	
20		Stephanie	Ok. Well this is one pizza with three toppings. So this becomes three pizzas with three toppings. Is that, does he have it better, because let him do it (motioning towards Robert).	
21		Teacher/ researcher	No, this is something we did in class - that he's working on. Ok, I'm sorry.	
22		Stephanie	So, um.	
23		Teacher/ researcher	I interrupted you.	
24		Stephanie	So this becomes three pizzas with three toppings, so then three pizzas with three toppings plus one pizza with three toppings is four pizzas with three toppings	

Description: Clip 4: Justifying the Isomorphism Parent Tape: Pizza Problems with Four and Five Toppings Date: 1999-03-01 Location: David Brearley High School Researcher(s): Professor Carolyn Maher	Transcriber(s): Marcelle Farhat, Elijah Brookes, Gary Wenger, Anat Even-Zahav Verifier(s): William McGowan Date Transcribed: Fall 2010 Page: 2 of 5
---	--

Line	Time	Speaker	Transcript	Code
25		Teacher/ researcher	This is three pizzas with...	
26		Stephanie	Three toppings – for this one. For this one... right? (Looks at Shelly for help).	
27		Shelly	(Mumbles inaudibly, looks frustrated).	
28		Teacher/ researcher	I'm just trying to get, I'm just trying to get the language right. This is...	
29		Stephanie	I have to start all over, I have to go from here, because I'm forgetting what I'm doing. Ok this – to get four pizzas with one topping you already have three pizzas with one topping, and the plain pizza becomes the pizza with the new topping.	
30		Teacher/ researcher	Ok.	
31		Stephanie	Ok, so this becomes, instead of one plain pizza this is one pizza with one topping – because this one's getting like the pepperoni thrown onto it.	
32		Teacher/ researcher	Ok, ok.	
33		Stephanie	And that produces the one, the four pizzas with one topping.	
34		Teacher/ researcher	This is four pizzas with one topping. You didn't need to add anything to these? These just sort of became these?	
35		Stephanie	Those were, those just got brought down.	
36		Teacher/ researcher	Those got brought down. Ok.	
37		Stephanie	Those are the same three pizzas. So then here, you have six pizzas with two toppings. Now you already have three pizzas with two toppings, so these three pizzas with one topping get an extra topping added on.	
38		Teacher/ researcher	Ok.	
39		Stephanie	So these become three pizzas with two toppings. And then three pizzas with two toppings plus three pizzas with two toppings equal six pizzas.	
40		Teacher/ researcher	(Together with Stephanie) With two toppings. But now you're because you're choosing from four now, right?	
41		Stephanie	Yes. So now this is right, I'm not... right? Right?! (Looks around).	
42		Shelly	Yes. (Students laughing softly).	
43		Teacher/ researcher	How about that last one? Just this last one. Now this is three, this is, there's only one pizza that has all three of these toppings and-	
44		Stephanie	Yes.	

Description: Clip 4: Justifying the Isomorphism Parent Tape: Pizza Problems with Four and Five Toppings Date: 1999-03-01 Location: David Brearley High School Researcher(s): Professor Carolyn Maher	Transcriber(s): Marcelle Farhat, Elijah Brookes, Gary Wenger, Anat Even-Zahav Verifier(s): William McGowan Date Transcribed: Fall 2010 Page: 3 of 5
---	--

Line	Time	Speaker	Transcript	Code
45		Teacher/ researcher	-and then that, how does that move into here?	
46		Stephanie	That just drops down.	
47		Teacher/ researcher	Oh, it just drops down. Because it still has...	
48		Stephanie	Yeah, so that's the one pizza with three toppings. And then you need, then these become... these all get an extra topping added onto them. Like these are three pizzas with two toppings, so they all get the extra topping that you would have here. Like the pepperoni that is here, or whatever, gets thrown onto these three pizzas that don't have pepperoni, but have two other toppings. So now there are three pizzas with three toppings.	
49		Teacher/ researcher	Ok.	
50		Stephanie	You add them to the one pizza with three toppings and you get your four pizzas with three toppings.	
51		Teacher/ researcher	Now I understand all of that, but I don't know if that's the answer to the question.	
52		Stephanie	I hope so. Thank you. And here... (hands colored markers back to Teacher/researcher).	
53		Teacher/ researcher	Let me see that again, Robert.	
54		Robert	Oh	
55		Teacher/ researcher	That just made me think of a thing you were doing in class with the adding of the um,	
56		Robert	Oh yeah, it's kind of the same, I don't know, I just remember doing it.	
57		Teacher/ researcher	Because what were we, we were adding... The thing you came up with, you were adding on... What did I ask you to do? Wasn't it something like this? Doesn't adding up numbers like this...	
58		Robert	Yeah, but it was like a pattern, so I didn't use it, but.	
59		Teacher/ researcher	You didn't use what you used in class on this, or?	
60		Robert	No, because... Here, can I show them?	
61		Robert	Yeah, go ahead.	
62		Robert	Alright, see this is four toppings right here. And one plus four plus six plus four plus one equals sixteen, and two the fourth is sixteen. And three toppings- one, three, three, and eight (sic) [one], is eight. And two to the third is eight. And then one, two, one is four, and two to the second is four. There's supposed to be two up here – and one plus one is two, and two to the first is two. And then we got thirty-	

Description: Clip 4: Justifying the Isomorphism Parent Tape: Pizza Problems with Four and Five Toppings Date: 1999-03-01 Location: David Brearley High School Researcher(s): Professor Carolyn Maher	Transcriber(s): Marcelle Farhat, Elijah Brookes, Gary Wenger, Anat Even-Zahav Verifier(s): William McGowan Date Transcribed: Fall 2010 Page: 4 of 5
---	--

Line	Time	Speaker	Transcript	Code
			two for the next one and we add that up there and we get thirty-two, and two to the fifth is thirty-two. So I guess it's two to the number of toppings is how many combinations there are for pizza toppings.	
63		Teacher/ researcher	I wonder whether like, whether the two plays any role in that – like why all these have two. Is that something you thought about?	
64		Robert	Yes, I remember something with towers that we did to find the total combinations – it was two to the something....	
65		Teacher/ researcher	Does that apply here?	
66		Robert	Yeah, it's the same thing.	
67		Teacher/ researcher	With pizza toppings?	
68		Robert	'Cause	
69		Teacher/ researcher	But they're so many different pizza toppings, it's not like there's green and purple or whatever colors you used. Yeah.	
70		Stephanie	Mmhm	
71		Robert	So I guess like if you want to find out, if there's ten toppings you just do (ten,) two to the tenth. Then you got how many combinations there are.	
72		Teacher/ researcher	Well, why does that work? I mean if there's ten different toppings, I figure you'd have to go through... I don't even know if there are ten toppings you would want to put on pizza. Well I guess there are.	
73		Robert	I think it's more like, um, it's something like, if you have (draws an a on a piece of paper) and then you go to “b” and then like you have “a” and then you keep going by two like this is one and this two and then you keep adding. I forget what it was but we did it before.	
74	62:55	Gina	...can go here or here?	
75		Stephanie	yes	
76		Gina	And so forth	
77		Stephanie	yes	
78		Gina	So each of these pizzas-	
79		Stephanie	-has two, like, spots.	
80		Gina	Oh, that's interesting.	
81	63:00	Stephanie	One where it has, where it stays the same, and one where it gets added a topping.	
82		Gina	So each one has two new things that happen.	
83		Stephanie	Yes.	
84		Gina	Amy?	

Description: Clip 4: Justifying the Isomorphism Parent Tape: Pizza Problems with Four and Five Toppings Date: 1999-03-01 Location: David Brearley High School Researcher(s): Professor Carolyn Maher	Transcriber(s): Marcelle Farhat, Elijah Brookes, Gary Wenger, Anat Even-Zahav Verifier(s): William McGowan Date Transcribed: Fall 2010 Page: 5 of 5
---	--

Line	Time	Speaker	Transcript	Code
85		Amy-Lynn	Maybe that's where he got the two to the n. Isn't that what Bobbie said before? Maybe that's where the two comes from?	
86		Gina	I don't know, what do you think? You had how many pizzas up in this row all together?	
87		Stephanie	All together? Um, eight.	
88	63:21	Gina	And how many pizzas in this one?	
89		Stephanie	Sixteen.	
90	63:30	Gina	And the next one you said-	
91		Stephanie	Thirty-two.	
92		Gina	Hmm, I don't know...	
93		Stephanie	It's you know, more of an idea than I had.	
94		Shelly	It makes sense. Yeah, that would, That's where each of the twos come from. You described the one, because that's used once. Then you have two, two, two – two raised to the third, that's eight, so....	
95		Stephanie	Yeah. That was good, that was really good (looking at Amy-Lynn)	
96		Amy-Lynn	You remember that, because I'll be the only one that... (trails off, inaudible).	
97		Gina	This one only goes here? Does it go here too?	
98		Stephanie	Yes. It drops down as a plain pizza.	
99		Gina	I see. Ok, so your drop down idea is that it stays the same?	
100	64:01	Stephanie	It stays the same once, and it changes once.	
101		Gina	Right, Ok.	
102		Stephanie	That's where, I guess, Amy got the two.	
103		Gina	Very interesting, ok. Do you agree with this? (Looks at Robert).	
104	64:15	Robert	Uh-huh.	