

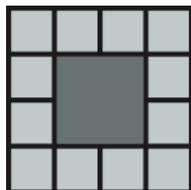
Transcript: Pool Border Problem

Deborah Ball's Class
Fourth grade, Park City Mathematics Institute
Wednesday, July 28, 2004 (Class session #8)

Seating Arrangement

Alexandra								Alli
Kara								Jane
Tanner								Justin
Drew								Joey
Sarah								Danielle
Emily								Alisa
	Renz	Kevin	Elizabeth	Masha	Ruzele	Patrick	Mitchell	

July 28, 2004:



How many square tiles does it take to build a border around a square "pool"? Find a way to know the number of tiles it will take without having to count, for any size pool.

Focus questions:

- How are students reasoning about the problem?
- How are students supporting/explaining their approaches using words, drawings, or tools?
- What is the teacher doing to establish and maintain an environment that nurtures student reasoning practices?

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- 1 Teacher: We're gonna go to the Pool Border Problem now,
2 and we're gonna start where we ended yesterday
3 when we were trying to talk about is there a way
4 to figure out how many tiles there are in the
5 border without counting them. And I told you that
6 Sarah had a method, but I think other people
7 have methods too. So I thought maybe we would
8 start by asking Sarah to explain hers, so in case
9 you haven't gotten an idea of what a method
10 could be, you can see one, and I'm gonna use
11 Sarah's method to get us thinking a little bit about
12 what that is like to have one. Okay? But it's not
13 the only one that we can find here, so that's why
14 even if we talk about Sarah's, there'll be others
15 that we can talk about and we can compare them.
16 So, Sarah, could you try explaining yours to us?
- 17 Sarah: Okay. So if you have a three by three square-
- 18 Teacher: Maybe you should go up to the board
- 19 Sarah: Yeah.
- 20 Teacher: so people can follow you. I want you to listen-
- 21 Sarah: Well, I'll do a two by two.

22	Teacher:	I want you to listen very carefully to what Sarah's	58	Teacher:	Can you face the class as you're talking?
23		saying and if you don't understand, please raise your			
24		hand.			
25	Sarah:	Okay, I'm gonna do two by two because it already has a	59	Sarah:	If you had any square with my method you could
26		border. So there's a two by two. So what we're gonna	60		just do the border 'cause all you would have to
27		do is we're gonna start right up here at the yellow, and	61		know is the side. So like for four, you would do
28		we're gonna go down three. (<i>Moves finger from the</i>	62		five- there would be five and then you'd do five
29		<i>top-left tile to the third tile down</i>). So that's three. And	63		times four and that'd equal twenty.
30		then we're gonna do three again. Three, three, and	64	Teacher:	Okay. So explain to them why for the four by four
31		three. (<i>Moves finger over perimeter tiles</i>). So then all	65		you would count fives.
32		you have to do for- And then that would equal twelve	66	Sarah:	Because you always count one more. Here, can I
33		tiles, and how you know is you could do three times	67		use these? (<i>Joins five tile pieces on the left side</i>
34		four 'cause there's four times where you did the three.	68		<i>of the four square pool</i>). Okay so like right here-
35		And so you could do three times four and that would	69	Teacher:	Alisa, pay attention.
36		equal twelve. And for any-			
37	Teacher:	Well, wait. So stop right there to see if they understand	70	Sarah:	Okay, right there. Well, you could just do four,
38		it when it's the two by two square. If you want her to	71		but then it would be like- It wouldn't- It would
39		show you that again, raise your hand because, of right	72		be harder 'cause there's not four all the way
40		now, she's just explaining her method around- for the	73		around. And since there's- Okay, there's four in
41		two by two square. Does everyone see what she-	74		this square right there. No, I mean five. You can
42		you see the three she's showing you or would you like	75		count five, but it wouldn't be five all the way
43		to see it again? Raise your hand if you'd like her to	76		around. But there's four right here, s- There's
44		show you the threes again.	77		four right here and then there's six right here and-
45	Sarah:	Okay, so you go here. You go to three-	78	Teacher:	Six or five?
46	Teacher:	Count them- Kind of count them carefully 'cause	79	Sarah:	There's six. Like one, two, three, four, fi- Oops.
47		people-	80		Oh, five, sorry, I'm confusing myself. (<i>Adds a</i>
48	Sarah:	One, two, three. (<i>Begins counting the tiles one-by-</i>	81		<i>sixth tile on the left side of the four square pool</i>).
49		<i>one</i>). Okay, so then there's three. And then one, two,	82	Teacher:	So your side length is four and you're showing us
50		three, there's three. So one, two- Okay so one-	83		that you have to put five- Oh, you're gonna put six
51		There's three there, three there, three there, and three	84		on? I thought your method was to use five.
52		there. And we didn't recount any. (<i>Moves finger over</i>	85	Sarah:	Yeah, but I want to show you something. Okay,
53		<i>perimeter tiles</i>). And you could count four and then	86		there's six, but you can't do six all the way
54		three and then three. No, you could do four and then-	87		around. So you would use five. (<i>Removes the</i>
55		Yeah, but you can count all around, but that would take	88		<i>sixth tile</i>). And how you'd know it'd be five, you
56		less time. And so if I had any, like, square, and I knew			
57		the side, I could-			

89	always do one more than the side because that way you	104	multiplied four which would- And then you'd do
90	can go all the way around. So if the side was four you	105	that. And then you'd multiply, and once you get
91	would do five 'cause it's one more. And then-	106	the answer that's how many squares- That's how
		107	much the border would be?
92	Teacher: Okay, and why do you multiply that by four?		
		108	Sarah: Yeah.
93	Sarah: Because there's four sides. One, two, three, four.		
94	(<i>Counts the sides of the pool</i>).	109	Mitchell: Okay. Eight hundred four.
95	Teacher: Okay, so now let's have some questions for Sarah. So	110	Teacher: Would somebody else like to come up and check
96	you're s- Can you- She's saying if you know the side	111	the method on a bigger square just to see if you
97	length, you would add one to the side length, and then	112	can understand how it works? We have some
98	you would multiply by four to go all the way around.	113	other larger ones up there. Could someone come
99	Does everyone understand what she's saying? Okay, so	114	up and try to put the tiles up and see if you can
100	let's have some questions for her about that. Mitchell?	115	show what Sarah's saying? So Sarah has a
		116	proposal for a method that she says will work. All
		117	we have to know is the side length. So who
101	Mitchell: Well for if- Let's say you had a square with a two	118	thinks they understand what she's saying and
102	hundred side length, you'd just have a- you'd have a	119	could try it out on another square?
103	two hundred- you'd have a two hundred and one		