

S-Pattern Task – CLIP 2

Teacher: Jeff Ziegler

District: Pittsburgh Public Schools

Grades: 11-12

Group 2 - Second Interaction with Teacher

- 90 T: Okay, I'm back. All right, so when I left, I asked the group to come up and explain how
91 we came up with $2x + (x - 1)^2$ and where that relates in the picture. So are you ready to
92 tell me?
- 93 S: Yeah.
- 94 T: Okay.
- 95 S: Well, actually I think that she made a different equation. I think hers is better.
- 96 S: I thought we were just going to go with this one.
- 97 S: We have one.
- 98 S: Hers is $x^2 + 1$.
- 99 S: Yeah, but that doesn't explain the picture.
- 100 T: What I asked when I left was does $2x + (x - 1)^2$ fit the pattern, correct?
- 101 S: It fit the pattern.
- 102 S: Yeah.
- 103 T: Okay. What I wanted to know when I left was how does it relate to the tiles?
- 104 S: Um...
- 105 T: Where is $2x$ in these tiles? Where is the $(x - 1)^2$ in these tiles?
- 106 S: Well x is that number right there.
- 107 T: Okay.
- 108 S: And 2, you just multiply 2 by that number...
- 109 T: Why?
- 110 S: Which gives you...

- 111 T: Why?
- 112 S: Because, um...
- 113 T: The tiles...
- 114 S: Because it gets bigger. It doubles.
- 115 S: Yeah, it doubles...
- 116 T: What doubles?
- 117 S: That...that...the tiles. Like for 1, it doubles and then for 2 it doubles, 3 it doubles.
- 118 S: That's the top and the bottom.
- 119 S: Oh, it's the top...oh it's the...oh, yeah. Those 2.
- 120 S: The x is the top number and the bottom.
- 121 T: What's the matter?
- 122 S: I don't...I mean, I understand but I can't really explain it. Like those 2...
- 123 T: If you want, see, my thoughts always were if you really, truly understood then
124 explaining would be the easy part.
- 125 S: Well, I do understand but...2 is right here. That's where they got the 2 from.
- 126 S: $2x$.
- 127 S: Like $2x$ 'cause you just take out those 2 and then use that. And then $x - 1$ is like $4 - 1$.
- 128 S: Which is 3.
- 129 S: Three. Oh yeah. How much is...each row right there. Then you square it and that's how
130 much is in the middle.
- 131 T: Okay, so...
- 132 S: Has to be a square number.
- 133 T: Take the sheet of paper right now. Take number 4. Separate...I want you to actually
134 manipulate those black tiles on here. Show me the $2x$, show me the $(x - 1)^2$.
- 135 S: All right.
- 136 T: Okay.

Group 1 -- Second Interaction with Teacher

- 137 S: You add 1.
- 138 T: Are you listening? (*Teacher directs this to the student he is sitting next to.*)
- 139 S: I am.
- 140 S: All right, you have 2 on the bottom, 2 on the top (*referring to the second figure in the*
141 *sequence*).
- 142 S: I get it.
- 143 S: You got 1 in the middle that's an extra. So you add that. That's plus 1. So it's 2 and 2 is 4.
144 That's 2 squared is 4 then you add this extra 1 in the middle. That's 5.
- 145 T: Okay. What is, what is he telling me here? Where $(x + 1)^2$ came from.
- 146 S: Are you asking me?
- 147 T: Yeah, I'm asking you.
- 148 S: Oh, I get it. It's like, because you start off with 1 and then you times it by itself and then
149 you add 1.
- 150 T: Okay.
- 151 S: And then you just keep going...you want me to keep going?
- 152 T: No, what I want you to do is...I want you to take these, these black tiles that are sitting
153 right here (*referring to the figures of tiles*) and I want you to show me, I want you to
154 show me, where do you see 2 squared? And then where's the plus 1 at?
- 155 S: Like...
- 156 T: Where's the 2 squared?
- 157 S: Right here.
- 158 T: What's that?
- 159 S: And right here. These are 2.
- 160 T: Okay.
- 161 S: Then the 1 is the middle.

- 162 T: Okay. So, for number 2, for pattern 2, top row and the bottom row, you're putting those
163 2 together, making a square and adding 1 to it. So, if I did the same thing in pattern
164 number 3, I took the top row and the bottom row and I put them together, is that 3
165 times 3? Is there 1 left over? (*Students acknowledge that this doesn't seem to work.*) So,
166 what I'm telling you is, how do you manipulate these tiles for your $x^2 + 1$. If it obviously
167 works...
- 168 S: I mean, 'cause look, there's 1, 2, 3; 1, 2, 3; 1, 2, 3, we're just doing it like that.
- 169 T: Where?
- 170 S: And there's the 1 left over.
- 171 S: You can do that.
- 172 S: Come on, I can do this.
- 173 S: And this is the way to do 4, 4, 4.
- 174 T: Okay, you have...How many tiles do you have in pattern 3? How many tiles do you have
175 in pattern 3?
- 176 S: 10.
- 177 T: Okay. I'm giving you 10 individual tiles on this piece of paper. Okay? They're not
178 touching.
- 179 S: They're a new pattern?
- 180 T: I want you to take those 10 tiles and I want you to show me how you put them together
181 to get $x^2 + 1$. That's what I want you to show me.
- 182 S: We can go like this. Look.
- 183 T: I'll be back.
- 184 S: No, just stay with us.
- 185 S: "I'll be back" (*mimicking the teacher*).