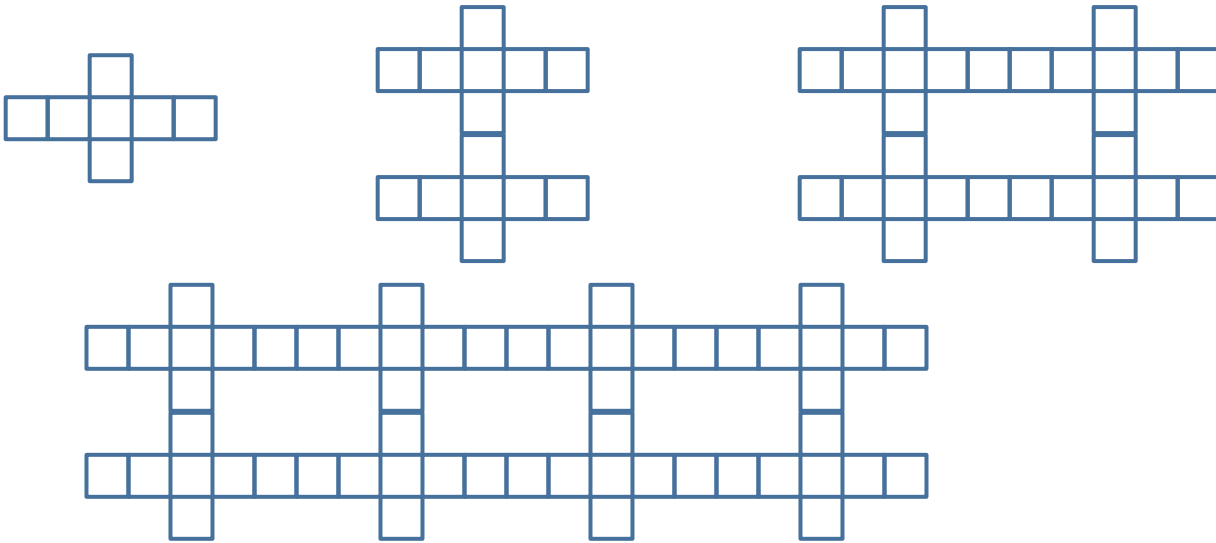


Making a Point 4.7

Zac and Sione went back to work on an extension of the quilt problem they were working on before. Now they have this pattern:



Zac: This one works a lot like the last quilt pattern to me. The only difference is that the pattern is doubling, so I knew it was exponential. I thought that it starts with 7 blocks and doubles, so the equation must be $f(x) = 3.5(2)^x$.

Sione: I don't know about that. I agree that it is an exponential function—just look at that growth pattern. But, I made this table:

x	1	2	3	4
$f(x)$	7	14	28	56

I used the numbers in the table and got this equation: $f(x) = 7(2)^{x-1}$.

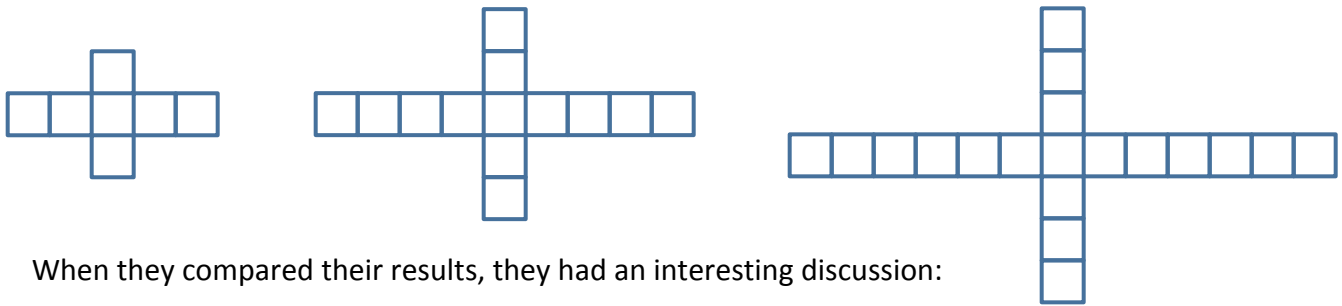
Mark: Very good work. I think those are both great and I think we can create a bunch more equations that will also work. See, $f(x) = 14(2)^{x-2}$, $f(x) = 28(2)^{x-3}$ all create that same thing on my calculator.

1. How did Zac get 3.5 in the equation?

2. How did Sione get an $x-1$ in her equation?

3. Is Mark correct? Can you use any of the equations? Why?

The students started working on predicting the number of quilt blocks in this pattern:



When they compared their results, they had an interesting discussion:

Zac: I got $y = 6n + 1$ because I noticed that 6 blocks were added each time so the pattern must have started with 1 block at $n = 0$.

Sione: I got $y = 6(n - 1) + 7$ because I noticed that at $n = 1$ there were 7 blocks and at $n = 2$ there were 13, so I used my table to see that I could get the number of blocks by taking one less than the n , multiplying by 6 (because there are 6 new blocks in each figure) and then adding 7 because that's how many blocks in the first figure. Here's my table:

1	2	3	4	n
7	$6+7 = 13$	$6+6+7=19$	$6+6+6+7 = 25$	$6(n-1) + 7$

Mark: Again, I think we can make a lot of equations that will work. I have these on my calculator and they are all the same: $y = 6(n-2) + 13$, $y = 6(n-3) + 19$, $y = 6(n-4) + 25$

4. Can all of the equations the students suggest work? Why or Why not?

5. If all the equations can work then make another one that would work?

6. Make an equation for each table below. (Use the strategy the students used above.)

a.

x	y
32	50
33	55
34	60

b.

x	y
26	78
27	70
28	62

c.

x	y
-15	32
-14	39
-13	46