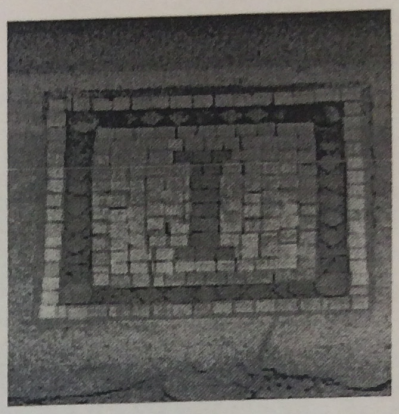
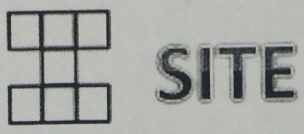
Mrs. clarks notes



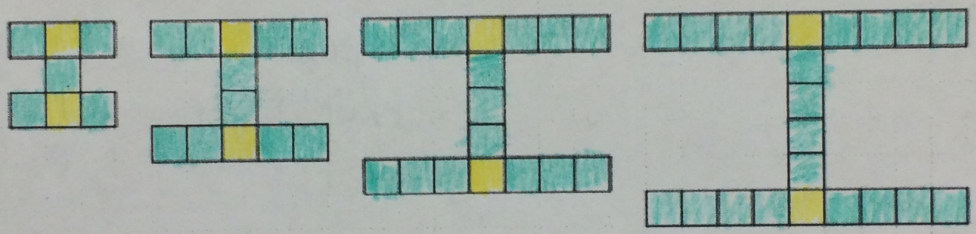
1.2 I Rule!

A Solidify Understanding Task

Marco has started a new blog about sports at Imagination High School (mascot: the fighting unicorns) that he has decided to call "I Site". He created a logo for the web site that looks like this:

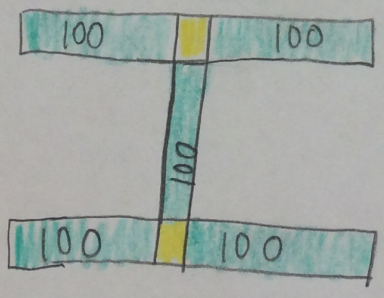


He is working on creating the logo in various sizes to be placed on different pages on the website. Marco developed the following designs:



Size 1	Size 2	Size 3	Size 4
7	12	17	22

1. How many squares will be needed to create the size 100 logo?



100+100+100+100+100+1+1=502

or

500+2=502

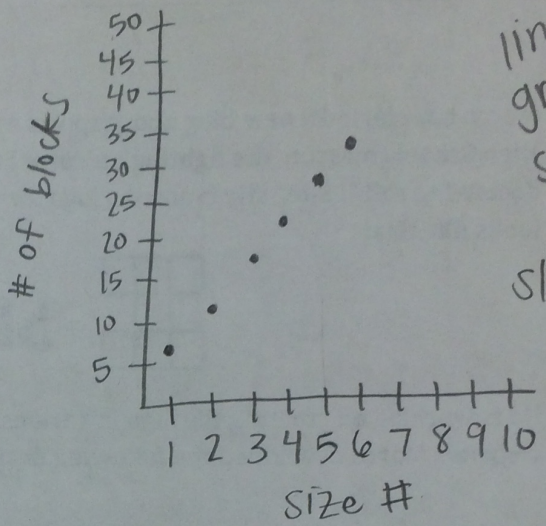
2. **Develop a mathematical model for the number of squares in the logo for size *n*.**

size #	# of blocks	
1	7	
2	12	> 5
3	17	> 5
4	22	> 5
5	27	> 5
6	32	> 5

linear function

first difference

rate of change = 5



linear graph = straight line

slope = 5

The graph is discrete. Meaning, we wouldn't connect the dots because we don't have size 1.5, etc.

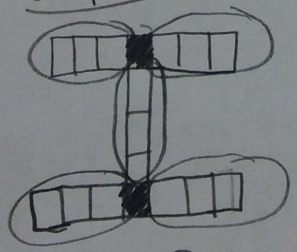
Recursive Formula

$f(x) = f(x-1) + 5$ → rate of change/slope

- $f(x)$: # of blocks in size n
- $f(x-1)$: # of blocks in size $n-1$

Both equations are linear.

Explicit Formula



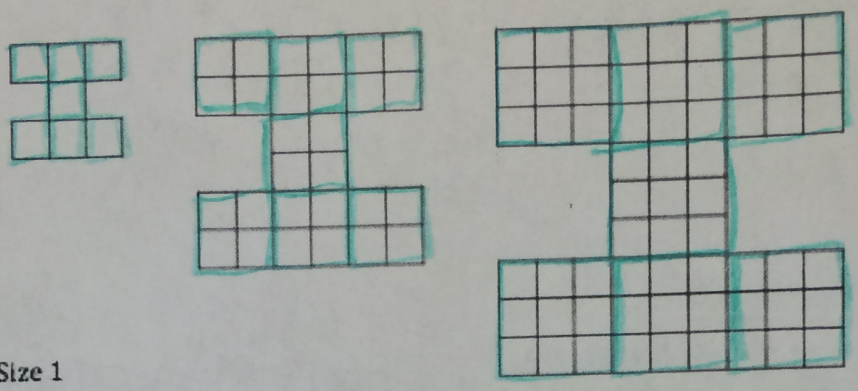
Size 3

5 groups of 3 plus 2 more

$f(x) = 5x + 2$

- slope: 5
- $f(x)$: # of blocks in figure x
- x: Figure #

Marco decides to experiment with making his logo "blockier" so that it looks stronger. Here's what he came up with:



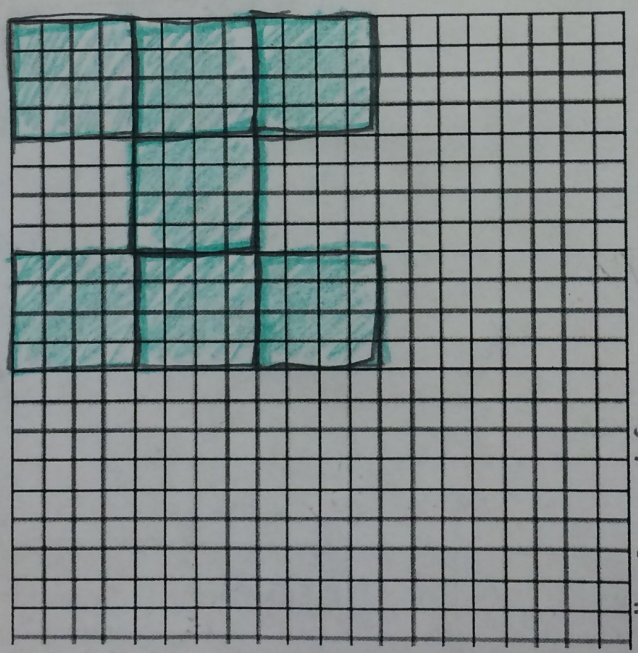
Size 1

Size 2

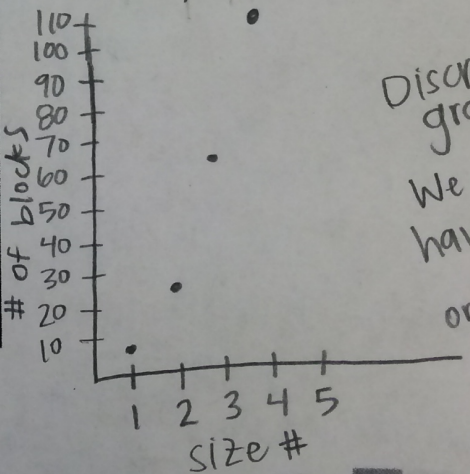
Size 3

3. Assuming that Marco continues with the pattern as it has begun, draw the next figure, size 4, and find the number of blocks in the figure.

112 blocks



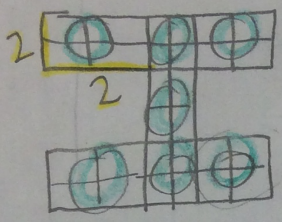
Size #	# of blocks	
1	7	
	> 21	
2	28	
	> 35	
	> 14	quadratic function
3	63	
	> 49	
	> 14	
4	112	



Discrete graph. We don't have size 1.5 or size 2.1 etc.

4. **Develop a mathematical model for the number of blocks in a logo of size *n*.**

Explicit equation



size 2

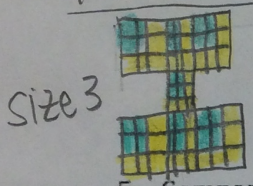
7 groups of $4 = 2^2$

$f(x) = 7 \cdot x^2$

# of blocks in size x

size #

Recursive equation



size 3

blue = blocks from size 2

yellow = blocks added

size #

$f(x) = f(x-1) + 7(2x-1)$

$= f(x-1) + 14x - 7$

linear part

5. **Compare the models that you developed for the first set of logos to the second set of logos. In what ways are they similar? In what ways are they different?**

Similarities

- both "I" shape
- both same size 1 figure

Differences

- "blockier" I's
- one is a linear function one is quadratic
- the 1st set of figures adds the same # of blocks each tim the second doesn't

	linear	quadratic
rate of change	constant	linear
graph	straight line	parabola ∪
table	1st difference is constant	2nd difference is constant
equation	$f(x) = mx + b$	$f(x) = \_x^2 + \_\_\_\_\_$