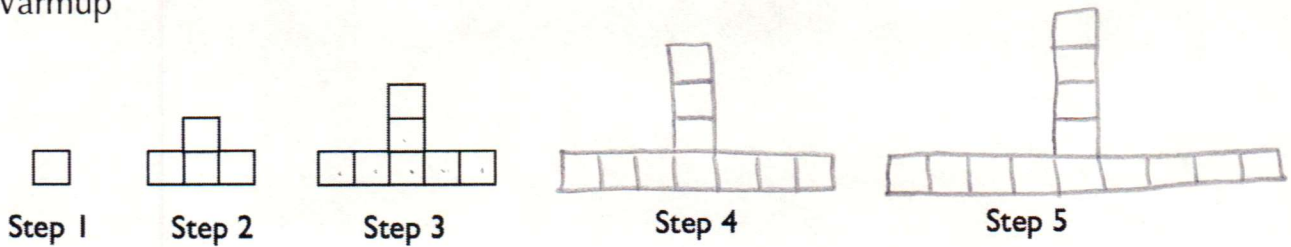


Notes 1.4 - Sequences

Warmup

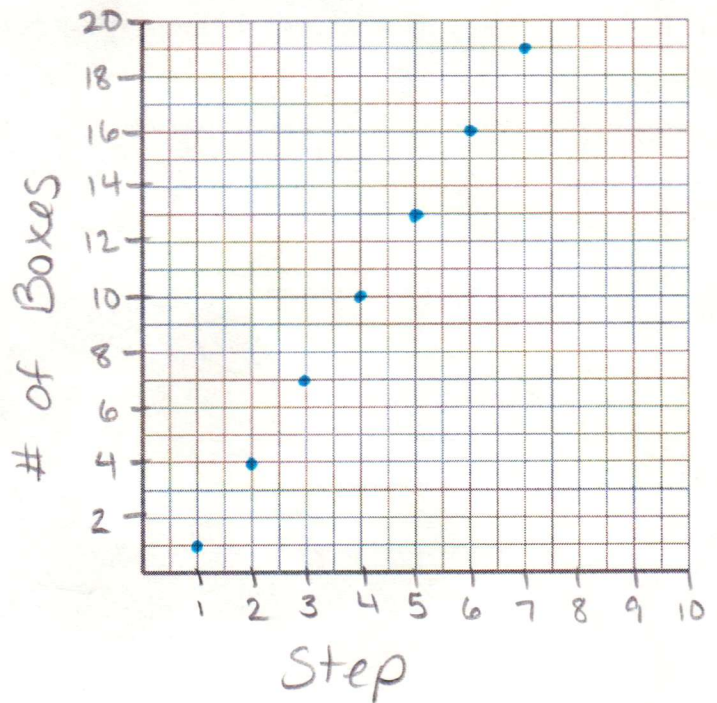


- a. Fill in steps 4 and 5 in the visual pattern above
- b. Fill in a table for the pattern

Step	1	2	3	4	5	6	7	8
Boxes	1	4	7	10	13	16	19	22
Change		+3	+3	+3	+3	+3	+3	+3

Common Difference: $+3$

- c. Graph the data from the table



- d. How many boxes will the 10th and 20th steps have?

10th $(22 + 3 + 3)$

20th

28 boxes

58 boxes

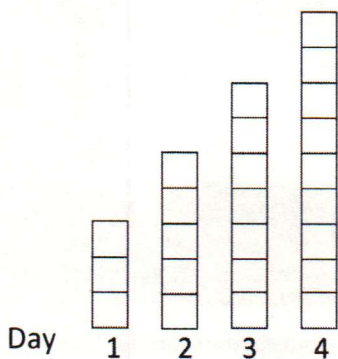
- e. Describe the pattern that you see and what a general rule may be to find later values.

Each step adds 3 boxes, except the first step where there was only one box.

Lesson

Word	Meaning/Notation	Example
Recursive Equation (Arithmetic)	Applying a rule to a previous term, you <u>must</u> include the first term	$\text{new} = \text{previous} + \text{rule}$ $\text{first term} = \underline{\hspace{2cm}}$ $f(n) = f(n-1) + \text{rule}$ $f(1) = \text{value} \text{ or } f(0) = \text{value}$
Explicit Equation (Arithmetic)	An equation that allows you to find any term in a sequence	$f(n) = an + b$ $a = \text{common difference}$ $b = \text{value at } n=0$

Scott has decided to add push-ups to his daily exercise routine. He is keeping track of push-ups on the chart below. After four days, he determines that he will be able to keep adding push-ups.



Day	Push-ups	Change	Sum
1	3		3
2	5	+2	3+2
3	7	+2	3+2+2
4	9	+2	3+2+2+2
5	11	+2	3+2+2+2+2
6	13	+2	3+2+2+2+2+2
7	15	+2	3+2+2+2+2+2+2

Recursive Equation

new = previous + 2
 first value is 3

$$f(n) = f(n-1) + 2$$

$$f(1) = 3$$

Explicit Equation

$$f(n) = 2n + 1$$

How many push-ups will he do on the 10th day?

$$f(10) = 2(10) + 1$$

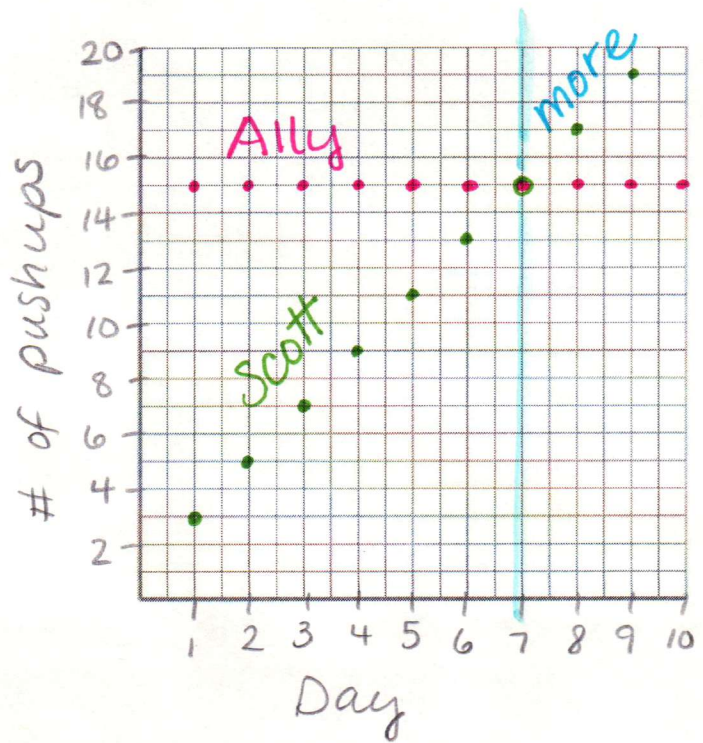
$$= 20 + 1$$

$$f(10) = 21$$

He will do 21 pushups on the 10th day.

Ally is also doing push-ups each day. She has decided to do 15 push-ups every day. She is positive that she does more push-ups than Scott. Is this true?

Day	Scott	Ally
1	3	15
2	5	15
3	7	15
4	9	15
5	11	15
6	13	15
7	15	15



How can you prove who does more pushups?

You can see on the table that after day 7 Scott does more. This is also shown on the graph.

Find the recursive and explicit equations for each of the patterns we used in the notes last class.

Term	Value	Change	Sum
1	66		66
2	50	-16	66-16
3	34	-16	66-16-16
4	18	-16	66-16-16-16
5	2	-16	
6	-14	-16	
7	-30	-16	

0 82

Recursive: $\text{new} = \text{previous} - 16$
 first value is 66
 $f(n) = f(n-1) - 16$
 $f(1) = 66$

Explicit: $f(n) = -16n + 82$

Term	Value	Change	Sum
1	-9		-9
2	-2	+7	-9+7
3	5	+7	-9+7+7
4	12	+7	-9+7+7+7
5	19	+7	-9+7+7+7+7
6	26	+7	
7	33	+7	

0 -16

Recursive: $\text{new} = \text{previous} + 7$
 first value is -9
 $f(n) = f(n-1) + 7$
 $f(1) = -9$

Explicit: $f(n) = 7n - 16$

What would the recursive and explicit equations be from the sequence in today's warmup?

Recursive: $\text{new} = \text{previous} + 3$
 first value is 1

Explicit: $f(n) = 3n - 2$

$f(1) = 1$