

LINEAR
Arithmetic
steady rate
of change

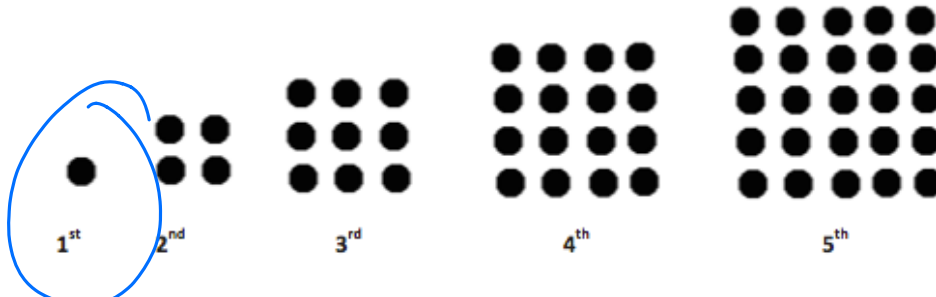
EXPONENTIAL
geometric
not
steady

LEARNING OBJECTIVE: We will explore geometric patterns and write formulas for the patterns. (Alg1M3L7)

CONCEPT DEVELOPMENT:

Ancient Greeks thought ALL of math was geometry related. Sequences of numbers were created based on the shapes they resembles.

Example:



What would this pattern be called?

PERFECT SQUARE PATTERN

Create a Table of values

Step	Dots
1	1
2	4
3	9
4	16
5	25

Is there a formula that can tell us what numbers would satisfy the rule?

$$D(x) = x^2$$

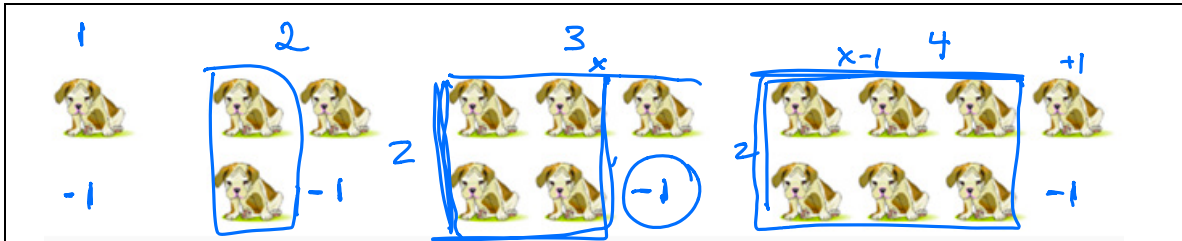
"The number of dots is equal to the value of the step squared."

$$D(15) = 225$$

$$\underline{\underline{D(x) = 200}} \leftarrow$$

GUIDED PRACTICE:**Steps for Analyzing Geometric Patterns**

1. Study the geometric image or picture carefully. What is happening as the pattern grows from one step to the next?
2. Create a table.
3. Write a formula that will help find the pattern in the n^{th} step.



Create a table:

Step	Puppies
1	1
2	3
3	5
4	7

Formula:

$$P(x) = 2x - 1$$

$$P(x) = 2(x-1) + 1$$

How many puppies will there be on the 60th step? How could you express this using the formula?

$$P(60) = 2(60) - 1$$

$$= 120 - 1$$

119 PUPPIES

Will there ever be a step with exactly 46 puppies? How do you know?

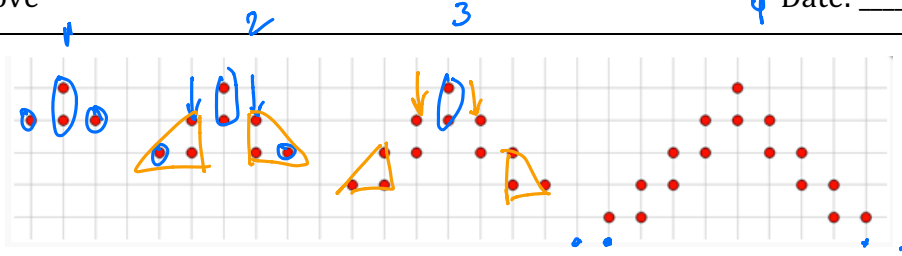
Always odd. Definition of an odd # is to multiply by 2 and add or subtract 1.

What is $P(253)$?

46 is EVEN.

$$P(253) = 2(253) - 1$$

$$= 506 - 1 = 505 \checkmark$$



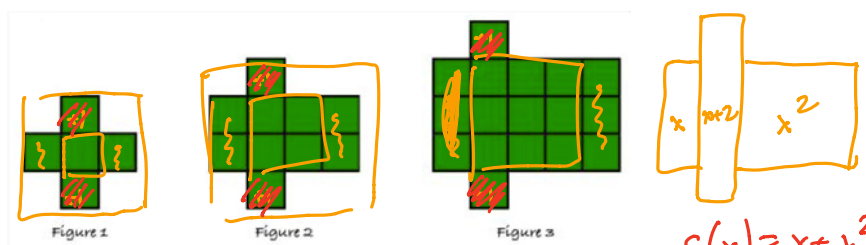
Create a table:

Term #	Dots
1	4
2	8
3	12
4	16

Formula: $D(x) = 4x$

How many dots in the 66th step? 264

Will $D(n) = 66$? Why or why not? No, 66 is divisible by 4



Create a table:

1	5
2	10
3	17

Formula:

$$S(x) = x^2 + 2x + 2$$

$$S(x) = (x+2)^2 - 2x - 2$$

$$S(x) = x(x+2) + 2$$

How many squares will there be in the 13th figure?

197

What is $S(32)$? 1090

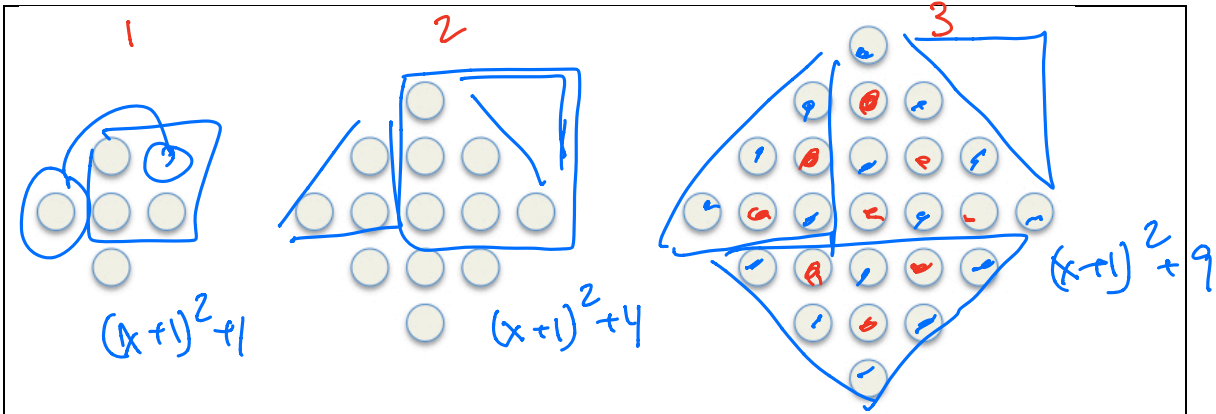
Find n if $S(n) = 626$

$$S(n) = n(n+2) + 2 = 626$$

$$n^2 + 2n = 624$$

$$n^2 + 2n - 624 = 0$$

24th step



Create a table:

Formula: $C(x) = x^2 + (x+1)^2$

Step	Dots
1	5
2	13
3	25

4 | 41

How many dots are in the 9th pattern?

How many dots will be in the 13th row of the 12th pattern? How do you know?

Will there ever be exactly 613 dots? If so, what pattern?

Name: _____

Math 7.2, Period _____

Mr. Rogove

Date: _____

INDEPENDENT PRACTICE:

ACTIVATING PRIOR KNOWLEDGE:

CLOSURE:

Compare the following tables:

x	$f(x)$
1	2
2	8
3	18
4	32

x	$g(x)$
1	-4
2	8
3	20
4	32

What is the difference in how the values change?

What are the formulas for each table?

What is $f(10)$?

What is $g(10)$?

NOTES:

Alg 1, Mod 3, Lesson 8

HW is problem set for Lesson 8.

Do Desmos demo 30 minutes.