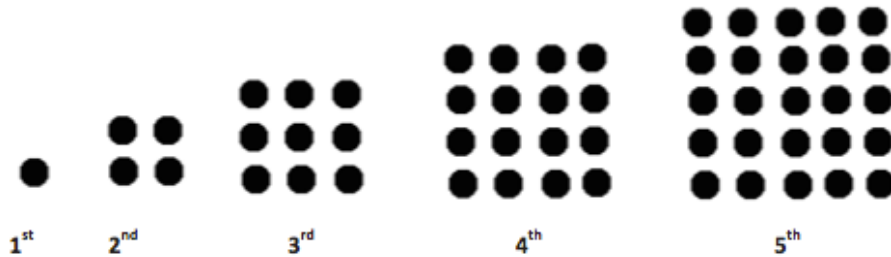


LEARNING OBJECTIVE: We will explore geometric patterns and write formulas for the patterns. (Lesson 94)

CONCEPT DEVELOPMENT:

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

Example:



What would this pattern be called?

perfect square pattern.

Create a Table of values

(x) Step	$D(x)$ 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?

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

D of x

$$D(15) = 15^2 = 225$$

The number of dots is equal to the square of the step number.

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:

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

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

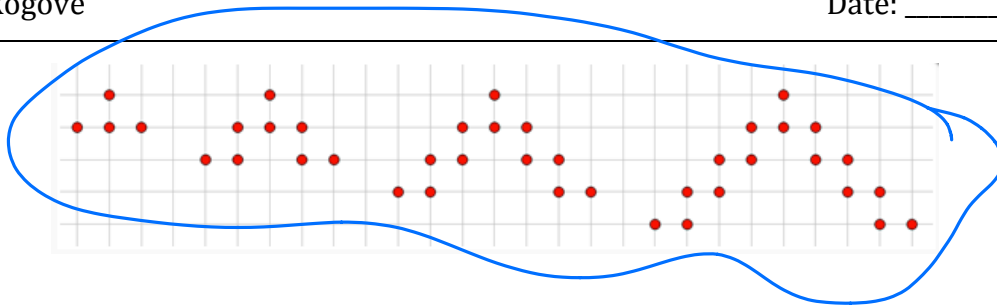
$$P(60) = 2 \cdot 60 - 1 = 119$$

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

No. 46 is even number. When you multiply by 2 and subtract 1, you will get odd #.

What is $P(253)$?

$$505$$



Create a table:

x steps	Dots $D(x)$
1	4
2	8
3	12
4	16

Formula:

$$D(x) = 4x$$

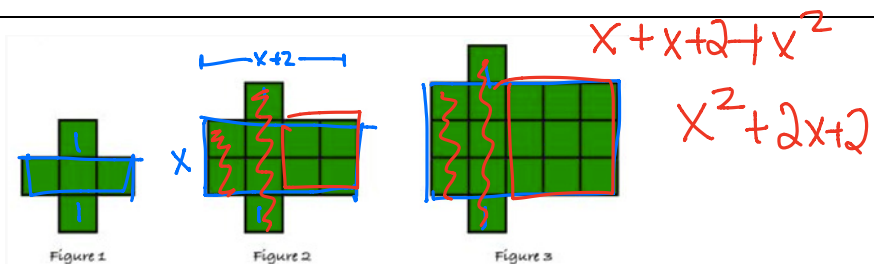
How many dots in the 66th step?

$$D(66) = 4 \cdot 66 = 264$$

Will $D(n) = 66$? Why or why not?

$$D(16) = 64$$

$$D(17) = 68$$



Create a table:

Step	Sq.
1	5 $4+1$
2	10 $9+1$
3	17 $16+1$

Formula:

$$S(x) = (x+1)^2 + 1$$

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

$$= x^2 + 2x + 2$$

How many squares will there be in the 13th figure?What is $S(32)$?

$$1090$$

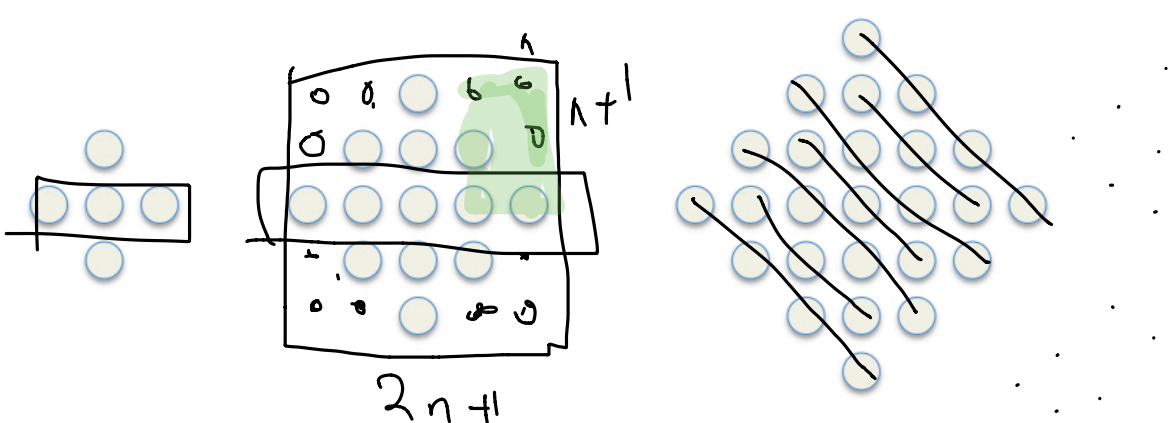
Find n if $S(n) = 626$

$$x^2 + 2x + 2 = 626 \quad 24^{th} \text{ step}$$

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

$$3 \quad (x-24)(x+26) = 0$$

$$x = 24$$



Create a table:

Steps	Dots
1	5
2	13
3	25

Formula:

$$\frac{(2n+1)^2 - 4(n^2+n)}{2}$$

How many dots are in the 9th pattern?

181

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

25

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

17² + 18² 17th patt.

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.