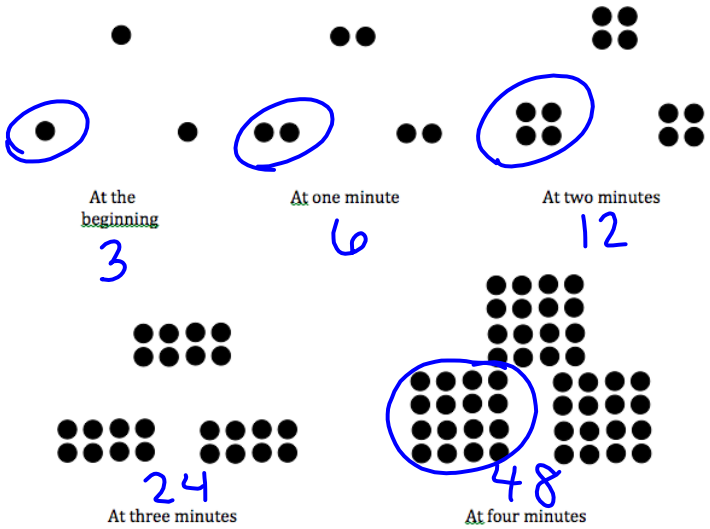
6-2 Geometric Sequences

Objectives:
I can write the recursive and explicit form of a pattern, table, story, etc.



1. Describe the pattern that you see in the sequence of figures above.

Doubling, or Multiplying by 2

2. Assuming the sequence continues in the same way, how many dots are there at 5 minutes?

48 x 2 = 96

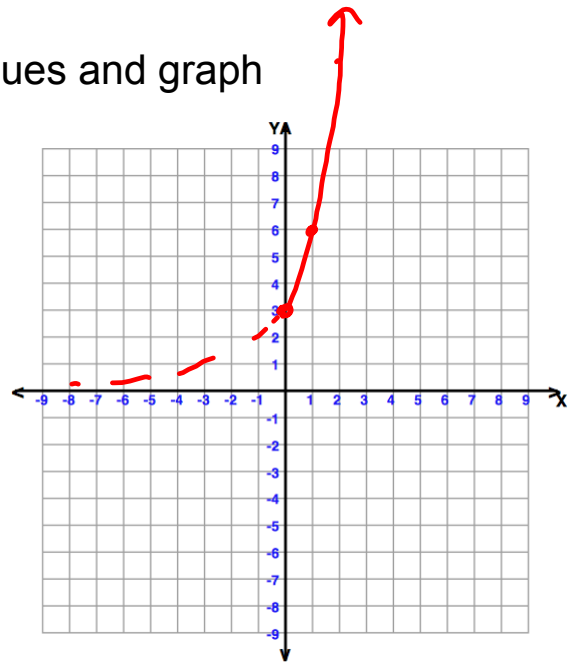
3. Write an equation to represent the pattern

Recursive $\begin{cases} f(0) = 3 \\ f(n) = 2 \cdot f(n-1) \end{cases}$

$f(n) = 3 \cdot (2)^n$

4. Make a table of values and graph

x	y
0	3
1	6
2	12
3	24



Vocabulary

Geometric: multiply by the same # every time

(a) Initial Value: the 0th term, starting value

(b) Common Factor: the number you multiply by

Explicit Function: $f(n) = a \cdot (b)^n$

Recursive Function:

$f(0) = a$ $\quad f(n) = b \cdot f(n-1)$

1, 2, 4, 8, 16, 32, 64, 128, 256, ...

×2 ×2 ×2

÷2

Common Factor: 2

Explicit: $f(n) = 1 \cdot (2)^n$

Recursive: $f(0) = 1 \quad f(n) = 2 \cdot f(n-1)$

EX. Using the ~~warm-up~~ question, build a table:

x	0	1	2	3	4	5
y	1	2	4	8	16	32

×2 ×2 ×2 ×2 ×2

x	0	1	2	3	4
y	8	4	2	1	1/2

×1/2 ×1/2 ×1/2 ×1/2

Initial Value: 8

Common Factor: 1/2

Explicit: $f(n) = 8(1/2)^n$

Recursive: $f(0) = 8$

$f(n) = 1/2 \cdot f(n-1)$

Initial Value: 2

Common Factor: 3

Explicit: $f(n) = 2 \cdot (3)^n$

Recursive: $f(0) = 2$

$f(n) = 3 \cdot f(n-1)$

$\frac{18}{6} = 3$ common factor

x	Y
0	2
1	6
2	18
3	54
4	162
5	486

×3

Find the 20th term of the sequence

explicit

$\frac{1}{4}$, 1, 4, 16, 64...

×4 ×4 ×4

$a = \frac{1}{4}$

$b = 4$

$f(n) = \frac{1}{4}(4)^n$

$f(20) = \frac{1}{4}(4)^{20}$

2.748779069E11 $\times 10^{11}$

2.749×10^{11}

Find the 25th term of the sequence

-3/2 -3, -6, -12, ...

×2 ×2

$a = -\frac{3}{2}$

$b = 2$

$f(n) = -\frac{3}{2}(2)^{n}$ (n = 25)

$f(25) = -50{,}331{,}648$

Determine the number of terms in the sequence

1, 3, 9, 27,..., 6561

n	f(n)
1	1
2	3
3	9
4	27
5	81
6	243
7	729
8	2187
9	6561 ★
10	

×3

Determine the number of terms in the sequence

6200, 2400, 1200,..., 75

$\frac{2400}{6200} = \frac{12}{31}$

EX. Scott decides to add running to his exercise routine and runs a total of one mile. He plans to double the number of miles he runs each week.

Initial Value:_____

Common Factor:_____

Explicit:_____

Recursive:_____

How many miles will he be running by week 5?

Allowance Task:
It's getting close to your 16th birthday and you have been trying to save some money so you can buy a car. As of now, your efforts have not brought in very much cash. You have been mowing lawns and also collecting an allowance from doing chores around the house. The car you want is $3,000. You have two different plans to try to get a new car in the next month:
Plan 1) Ask your parents to give you $100 dollars every day you do chores
Plan 2) Ask your parents for a new allowance where you will do the dishes every night for 1¢ on the first night, 2¢ on the second night, 4¢ on the third night, and so on for a whole month.

A) Which plan do you think your parents will agree to?

B) Write an equation for the first plan. How much money will you earn after 30 days?

C) Write an equation for the second plan. How much money will you earn after 30 days?