Name:

Unit 1: Milestone 4 (Part 2 of 2)

You will:

- build a function that models a relationship between two quantities.
- find or create a pattern that can be modeled using geometric sequences.

Learn:

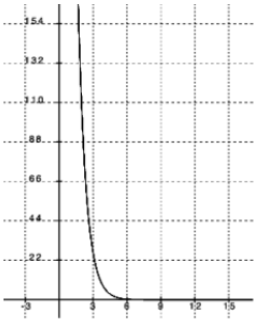
New Notes on Geometric Sequences:

Geometric Sequence: A geometric sequence goes from one term to the next by **multiplying** (or dividing) by the same value.

Example: Start with 400, and multiply by $(\frac{1}{4})$ to find the next term:

n	1	2	3	4	...	n
$f(n)$	400	100	25	6.25		
	400	$400\left(\frac{1}{4}\right)^1$	$400\left(\frac{1}{4}\right)^2$	$400\left(\frac{1}{4}\right)^3$		$400\left(\frac{1}{4}\right)^{(n-1)}$

400 is the first term, and every term after that is multiplied by $(\frac{1}{4})$.



This makes the exponent one less than the term number.

For this sequence, $f(n)=400(\frac{1}{4})^{(n-1)}$.

And in general terms,

$f(n)$=(starting number)(common ratio)$^{(n-1)}$.

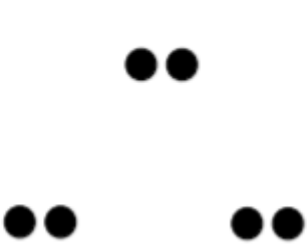
If the initial value is called A and the common ratio r, the expression can be written more simply as:

$f(n)=Ar^{(n-1)}$

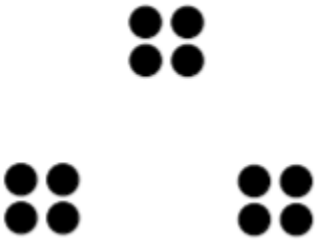
Do you see from the graph that the relationship between n and the corresponding number in the sequence is exponential?

If you need a refresher on graphing click here or scan the QR Code

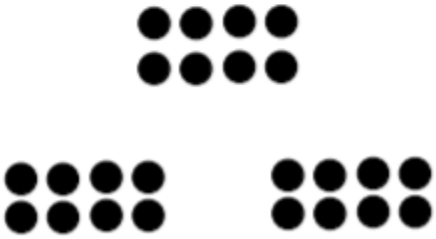
Growing Dots Problem:



At one minute



At two minutes



At three minutes

At four minutes

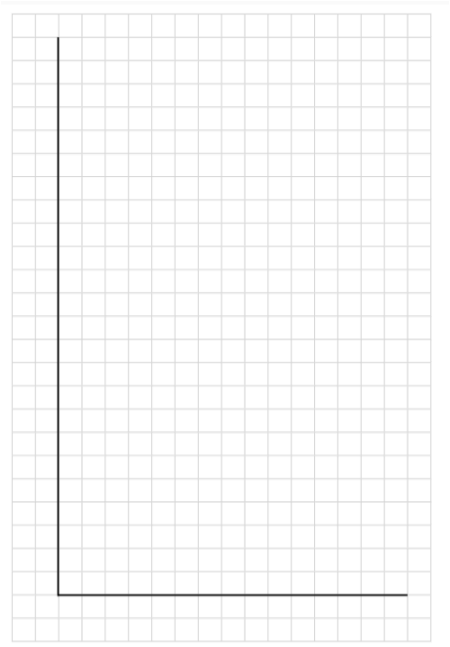
1. Describe and label the pattern of change you see in the above sequence of figures.

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

3. Fill in the table below to model this situation:

n						
$f(n)$						

4. Graph the data points and label the axis:



5. Find the explicit geometric formula for the geometric sequence.
   Hint: find $f(n)$=**(starting number)(common ratio)** $^{(n-1)}$

6. How many dots are there at 20 minutes? Hint: use your formula from #5.

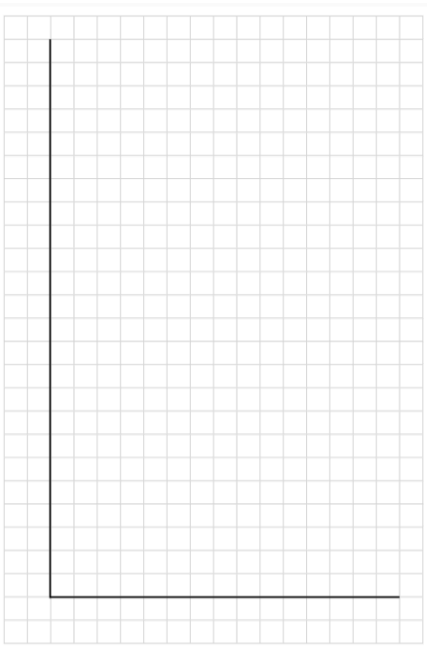
Bacteria Growth Problem:

A culture of bacteria doubles every 1 hour. At 1 hour of growth, there are 500 bacteria.

1. Fill in the table below to model this situation:

n					
$f(n)$					

2. Graph the data points and label the axis:



3. What is the explicit geometric equation?
   Hint: find **$f(n)$=(starting number)(common ratio)** $^{(n-1)}$

4. What does n stand for?

5. What does $f(n)$ stand for?

6. How many bacteria will there be after 24 hours?

Final Problem for Geometric Sequences:

1. Choose one of the following (You **must** let me know which one you choose first):

    a. Create a pattern that can be modeled using geometric sequences.

    b. Create a poster that explains geometric sequences from all that you have learned throughout the milestones.

    c. Help someone get through all the milestones, but you need to talk to me first and I will have a conversation with the student you help to check their progress.