Name: _____   Date: _____

Geometric Sequences: Day 2!

Do Now:
Find the 8th term of a geometric sequence where $a_2 = 20$ and $r = 5$?

$\times 5$

$$\frac{4}{a_1}, \frac{20}{a_2}, \frac{100}{a_3}, \frac{500}{a_4},$$

$$\frac{2500}{a_5}, —, —, \frac{}{a_8}$$

$a_n = a_1 \cdot (r)^{n-1}$

$a_n = 4 \cdot (5)^{n-1}$

$a_8 = 4 \cdot (5)^{8-1}$

$a_8 = 312,500$

Problem Solving and Geometric Explicit Formulas

1) The number of bacteria in a culture doubles each hour. The table shows the number of new bacteria for each hour.

$480 \div 240$

$r = 2$

n

a_n

Hours	①	2	3
Number of bacteria	120	240	480

$\times 2 \quad \times 2$

(a) Write an equation that can be used to find the number of new bacteria after n hours.

$a_1 = 120$

$r = 2$

$a_n = a_1 \cdot (r)^{n-1}$

$a_n = 120 \cdot (2)^{n-1}$

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PRESS + FOR ∆Tbl
  X      Y1
  0      60
  1      120
  2      240
  3      480
  4      960
  5      1920
  6      3840
  7      7680
  8      15360
  9      30720
  10     61440

X=0
```

(b) Find the number of bacteria after 5 hours.

$a_5 = 120 \cdot (2)^{5-1}$

$a_5 = 1920$

(c) After how many hours is the number of bacteria 7680?

equation
$y =$

$$\boxed{a_n = 120 \cdot (2)^{n-1}}$$

$7680 = 120 \cdot (2)^{n-1}$

STUCK

unknown → hours
↓
n

$\boxed{7\ hours}$

① Use Y= in your calculator
② Look at the table of values

1

$136 \div 272$ $544, 272, \underline{136}$

$\downarrow$

$r = .5$

2)   A digital city map displays an area of 544 square units. After you zoom in once, the area is 272 square units. After you zoom in a second time, the area is 136 square units.

(a) Write an equation that can be used to find the area after zooming in n times.

$a_1 = 272$ $a_n = a_1 \cdot (r)^{n-1}$

$r = \frac{1}{2}$ $a_n = 272 \cdot \left(\frac{1}{2}\right)^{n-1}$

(b) What is the viewable area after you zoom in five times?

$a_5 = 272 \cdot \left(\frac{1}{2}\right)^{5-1}$

$a_5 = 272 \cdot \left(\frac{1}{2}\right)^4$

$a_5 = 17$ Square units

$15300 \div 18000$

$.85$

3)   The table to the right shows the value of a car over a three year period after it had been purchased.

Year	Value ($)
1	18,000
2	15,300
3	13,005

(a) Write an explicit formula that represents the sequence.

$a_1 = 18000$ $a_n = a_1 \cdot (r)^{n-1}$

$r = .85$ ☆ $a_n = 18000 \cdot (.85)^{n-1}$

(b) How much will the car be worth after 8 years? *Round your answer to the nearest cent.*

$a_8 = 18000 \cdot (.85)^{8-1}$

$a_8 = \$5,770.39$

(c) After how many years will the car have a value of approximately $3,000?

☆ CALC

≈ 12 years

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X	Y1			
3	13005			
4	11054			
5	9396.1			
6	7986.7			
7	6788.7			
8	5770.4			
9	4904.8			
10	4169.1			
11	3543.7			
12	3012.2			
13	2560.4			

X=12

(d) What was the purchase price of the car?

(e) Would it be reasonable to use this model to predict the number of years it would take for the car's value to decline to about $100? Explain your reasoning.

4) Michael is sick with the flu but he still comes to school on Monday. He arrives at 8am and by 9am (Hour 1), Michael has already infected two of his friends, Joe and Lia. By 10am (Hour 2), Joe has infected two of his friends, Bill and Ted, and Lia has infected two of her friends, Jenny and Kiara.

(a) If each person with the flu infects two other people in each hour, how many students are infected by 3pm (Hour 7)? Complete the table and graph the points on the grid below.

Hour	n	0	1	2	3	4	5	6	7
Number of students infected each hour	$f(n)$	1	2	4					

(b) Does this situation represent an arithmetic or geometric sequence?

(c) Write an explicit formula to represent the sequence.

(d) Graph the sequence. Is it a picture of a line?
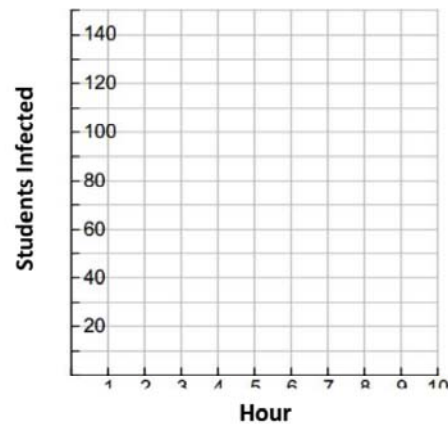
HOMEWORK QUESTION (Yes, it's just ~~one~~ two question, hooray!)

An archery competition begins with 256 competitors. After the first round, one-fourth of the competing group remains. After the second round, one-fourth of the now smaller competing group remains. The last round is when there are fewer than five members in the competing group.

(a) Which round is the last round?

(b) How many competitors are in the last round?