Unit 2 5.4 Sequences (Guided Notes) Name: _____

Objective: The student will be able to recognize a sequence, distinguish between arithmetic and geometric sequences, and understand/calculate the parts of each equation.

Sequence – A set of numbers in a specific order. It is discrete, not continuous.
Example1 - 8, 11, 14, 17, … Example2 - 6, 12, 24, 48 …

Discrete – Data that can only take certain values.
For example: the number of students in a class (you can't have half a student).

Term – Each number in the sequence.
In Example 1 above – the 2nd term is 11, the 4th term is 17.

Types of Sequences

Formulas:

$$a_n = a_0 + d \cdot n$$

Arithmetic Sequence – A sequence made by adding the same value each time.

$a_n =$_____

$a_0 =$ _____

$d =$_____

Does this sequence and it's formula remind you of an equation we've worked with earlier this year?

$n =$ _____

Example: Write an equation for the following arithmetic sequences.

a. 1, 5, 9, 13, 17, …

b. $-3, -6, -9, -12, \ldots$

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Geometric Sequence – A sequence made by multiplying the same value each time.

Formulas:

$$a_n = a_0 \cdot r^n$$

$a_n =$_____

$a_0 =$ _____

$r =$_____

$n =$ _____

Example: Write an equation for the following geometric sequences.

a. $1, 4, 16, 64, 256, \ldots$

b. $-32, 16, -8, 4, \ldots$

What if you can't easily find the '0' term?

Example: Write an equation for the following arithmetic sequences without using a_0.

a. $10, 14, 18, 22, \ldots (use\ a_1)$

b. $-10, -5, 0, 5, 10, \ldots (use\ a_4)$

Example: Write an equation for the following geometric sequences without using a_0.

a. $1, 3, 9, 27, 81, \ldots (use\ a_5)$

b. $512, 256, 128, 64, \ldots (use\ a_3)$

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What if you're given a term and have to find the 'n'?

Example: Given: $a_n = -30 + 6n$; If $a_n = 48$, what is n?

Example: Given: $a_n = 90 \cdot (\frac{1}{3})^n$; If $a_n = \frac{10}{27}$, what is n?

Practice:

I. For each sequence, state if it is arithmetic, geometric, or neither. Then, if it's arithmetic or geometric, write a formula for it.

a. $8, 6, 4, 2, 0, -2, \ldots$

b. $-4, 12, -36, 108, -324$

c. $64, 48, 36, \ldots$

d. $0, 3, 8, 15, 24$

e. $-24, -26, -18, -10, -2$

f. $5, 1, \frac{1}{5}, \frac{1}{25}, \frac{1}{125}$

II. Write the first 3 terms of the following sequences.

a. $a_n = -43 + 4n$

$a_1 =$ ____ $a_2 =$ ____ $a_3 =$ ____

b. $a_n = 2 \cdot (-3)^n$

$a_1 =$ ____ $a_2 =$ ____ $a_3 =$ ____

b. $a_n = 3 \cdot (2)^{n-1}$

$a_1 =$ ____ $a_2 =$ ____ $a_3 =$ ____

d. $a_n = -163 + 200(n - 1)$

$a_1 =$ ____ $a_2 =$ ____ $a_3 =$ ____

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Practice.

1. $a_n = 16 + 5n$
   a. Find the 80th term.
   b. If $a_n = 71$, what is n?

2. $a_n = -8 + 2n$
   a. Find the 50th term.
   b. If $a_n = 44$, what is n?

3. $a_n = 1080 - 36n$
   a. Find the 16th term.
   b. If $a_n = 900$, what is n?

4. $a_n = -600 + 5n$
   a. Find the 900th term.
   b. If $a_n = -225$, what is n?

5. $a_n = 3 \cdot 2^n$
   a. Find the 10th term.
   b. If $a_n = 192$, what is n?

6. $a_n = 700(0.8)^n$
   a. Find the 20th term.
   b. If $a_n = 358.4$, what is n?

7. $a_n = 60(\frac{1}{2})^n$
   a. Find the 10th term.
   b. If $a_n = \frac{15}{8}$, what is n?

8. $a_n = 1000(0.95)^n$
   a. Find the 16th term.
   b. If $a_n = 902.5$, what is n?