Name: _____ Date: _____

ARITHMETIC SEQUENCES
COMMON CORE ALGEBRA I

There are many types of sequences, but there is one that is related to linear functions and in fact is a type of **discrete linear function**. These are known as **arithmetic sequences**. Let's illustrate one first.

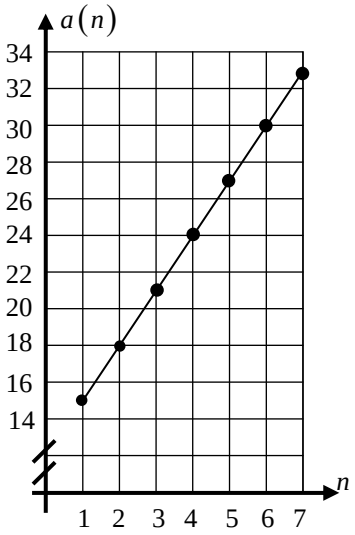
***Exercise* #1**: Evin is saving money for to buy a new toy. She already has \$12 in her account. She gets an allowance of \$4 per week and plans to save \$3 in her account.

(a) Fill out the table below for the amount of money Evin has after *n* weeks of saving.

n	$a(n)$
1	\$15
2	\$18
3	
4	
5	
6	
7	

(b) Write a **recursive definition** for this sequence.

(c) What's wrong with the graph of the sequence shown below?



(d) Evin proposes the following explicit formula for the amount of savings, *a*, as a function of the number of weeks saved *n*. Is this formula correct? Test it!

$a(n) = 3n + 15$

Arithmetic sequences are ones where the **terms** in the **list** increase or decrease by the same amount given a unit increase in the **index** (where the number is in line).

***Exercise* #2:** An arithmetic sequence is given using the recursive definition: $b_1 = -3$ and $b_i = b_{i-1} + 6$. Which of the following is the value of b_4? Show the work that leads to your answer.

(1) 24 (3) 21

(2) 12 (4) 15

Arithmetic sequences are relatively easy to spot and are easy to fill in, so to speak.

***Exercise* #3:** For each of the following sequences, determine if it is arithmetic based on the information given. If it is arithmetic, fill in the missing blank. If it is not, show why.

(a) 5, 9, 13, _____, 21, 25

(b) 5, 10, 20, 40, _____, 160

(c) 7, 4, 1, _____, −5, −8

(d) 64, 16, 4, _____, $\frac{1}{4}$, $\frac{1}{16}$

Finding a specific term in an arithmetic sequence without listing them sometimes can be a challenge, but not if you take your time and really think about it.

***Exercise* #4:** Consider an arithmetic sequence whose first three terms are given by: 4, 14, 24

(a) What is the 4^{th} term? How many times was 10 added to 4 to get to the 4^{th} term? Show a diagram to illustrate this.

(b) Use what you learned in part (a) to find the value of a_{10}, the 10^{th} term.

(c) Write a recursive formula for the a_n based on the term number *n*.

(d) Write an explicit formula for a_n.

***Exercise* #5:** Seats in a small amphitheater follow a pattern where each row has a set number of seats more than the last row. If the first row has 6 seats and the fourth row has 18, how many seats does the last row, which is the 20^{th}, have in it? Show your work to justify your response.

Name: _____ Date: _____

ARITHMETIC SEQUENCES
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. An arithmetic sequence is given using the recursive definition: $b_1 = 8$ and $b_i = b_{i-1} - 2$. Which of the following is the value of b_4? Show the work that leads to your answer.

   (1) 14 (3) 6

   (2) 2 (4) 4

2. For each of the following sequences, determine if it is arithmetic based on the information given. If it is arithmetic, fill in the missing blank. If it is not, show why.

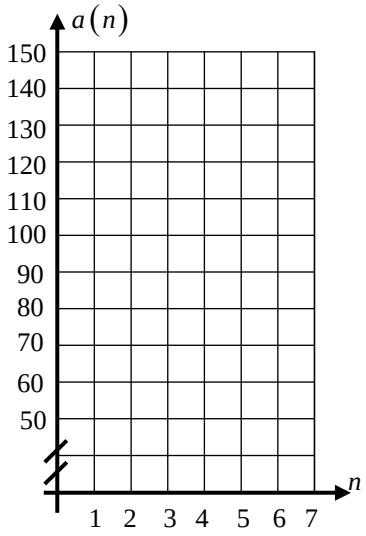
   (a) 12, 24, 36, _____, 60, 72

   (b) 10000, 1000, _____, 10, 1

   (c) _____, 24, 20, 16, 12, 8

   (d) $\frac{1}{4}$, $\frac{1}{2}$, _____, 1, $\frac{5}{4}$

3. Given a sequence defined by the explicit formula $g(n) = 15n + 35$, write out the first four terms. Then, create a recursive definition and graph the sequence on the interval $1 \le n \le 7$.



4. Which of the following is an arithmetic sequence?

(1) 2, 4, 8, 16, 32, 64

(2) 50, 45, 40, 35, 30

(3) 1, 1, 2, 3, 5, 8, 13

(4) 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$

APPLICATIONS

5. Evin is building a tower out of paper cups. In each row (counting from the floor up), there are two less cups than the row below it. The first row has 26 cups in it.

(a) State the number of cups in the second, third, and fourth rows.

(b) Give a recursive definition for this arithmetic sequence.

(c) How many cups will be in the 11^{th} row? Show the calculation that leads to your answer.

REASONING

6. Eric considers a sequence of numbers given by the following definition $b_1 = 7$ and $b_i = b_{i-1} + 4$ and decides the first 4 numbers are:

4, 11, 18, 25

(a) Interpret in your own words, what the sequence is saying and what he actually did.

(b) What should the first four numbers be?