8 Algebra CC
Unit 11 Review (Sequences)

Important Terminology

Sequence	Arithmetic	Geometric	Term (a_n)	Term Number (n)
Common Difference		Common Ratio	Explicit	Recursive

What should I be able to do?

1. Determine if a sequence of numbers is arithmetic or geometric.
2. Find the common difference or the common ratio of a sequence.
3. Define arithmetic and geometric sequences explicitly using the following formulas:
   - $a_n = a_1 + d(n - 1)$
   - $a_n = a_1 \cdot r^{n-1}$
4. Generate an arithmetic or geometric sequence in the context of a situation.
5. Generate a sequence of numbers using a recursive rule.
6. Define arithmetic and geometric sequences recursively using the following formulas:
   - $a_n = a_{n-1} + d$, $a_1 =$
   - $a_n = a_{n-1} \cdot r$, $a_1 =$

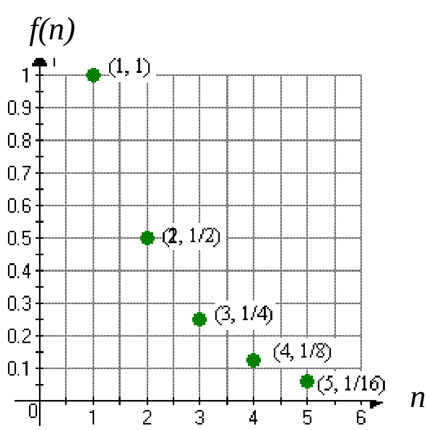
<u>**Practice Problem Set**</u>

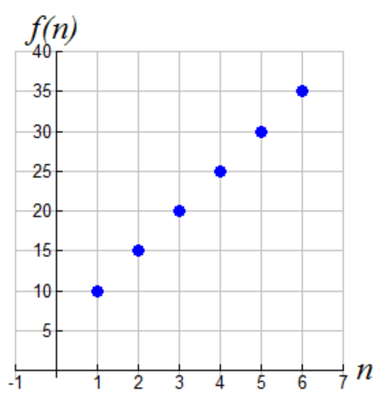
1. Determine if each sequence below is *arithmetic*, *geometric* or *neither*. If the sequence is arithmetic, state the <u>common difference</u>. If the sequence is geometric, state the <u>common ratio</u>.

a) $\frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \ldots$ b) -4, -16, -52, … c) -19.2, -13.9, -8.6, …

2. Write an <u>explicit formula</u> to find the *n*th term.

a) 5, 8, 11, 14, … b) $a_3 = 54$ and $r = 3$

c) 

d) 

3. Write an explicit rule for an arithmetic sequence if $a_1 = 7$ and $a_{14} = 85$. Using your rule, find the 25th term.

4. Raymond works at a restaurant. He turns on the faucet to fill the sink with water so he can wash pots and pans. After one minute, there are 2.75 gallons of water in the sink. After two minutes, there are 5.5 gallons of water in the sink. After three minutes, there are 8.25 gallons of water in the sink.

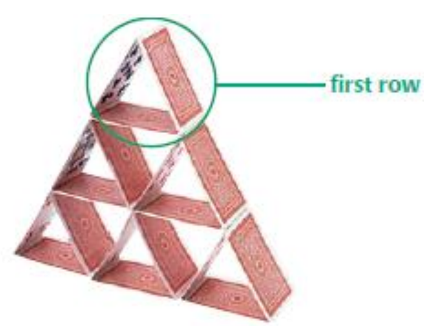
   a) If this pattern continues, write an explicit rule that can be used to find the number of gallons of water in the sink after *n* minutes.

   b) How many gallons of water are in the sink after 6 minutes?

   c) When he turns off the water, there are 52 gallons of water in the sink. To the *nearest tenth* of a minute, determine how long he let the water run.

5. You are making a house of cards similar to the one shown.

   a) Write an explicit rule that can be used to find the number of cards in the *nth* row.



   b) What is the number of cards in the 14th row?

   c) If there are 54 cards in the last row, how many rows were used to make the house of cards?

6. Bacteria can multiply at an alarming rate. Each bacteria splits into two new bacteria each hour.

   a) Create a table of values that represent the first four terms of the sequence described in the above scenario.

Hours **n**	**Number of Bacteria** **f(n)**
1	1
2	
3	
4	

   b) Write an explicit rule to represent the sequence.

   c) If we start with one bacteria in the first hour, how many bacteria will we have by the end of one day?

   d) How many hours does it take to produce 512 bacteria?

7. Write a <u>recursive rule</u> for each of the following sequences.

   a) -7, -3, 1, 5…

   b) $\frac{1}{2}$, -1, 2, -4…

8. If $a_n = 5a_{n-1} - 2$ and $a_1 = -1$ then find a_4.

9. If $f(1) = 10$ and $f(n) = -3f(n - 1) + 1$ then find $f(5)$.

10. Four students were given the following problem:
    Dave mowed his lawn yesterday and the newly cut grass stands 1 inch tall. Every day the grass grows about 0.2 inch. Write a function rule that can determine the height, $f(n)$, of the grass in n days.
    The function rules created by the four students are listed below. Analyze each function rule and determine if the student is correct or incorrect. <u>Explain your reasoning.</u>

    Student A: $f(n) = 0.2n + 1$

    Student B: $f(n) = 1(0.2)^{n-1}$

    Student C: $f(n) = f(n - 1) + 0.2$ and $f(0) = 1$

    Student D: $f(n) = 1.2 + 0.2(n - 1)$