

# Lesson 3.1.3: Arithmetic and Geometric Sequences

## Targets:

1. I understand the difference between an Arithmetic Sequence and a Geometric Sequence.
2. I understand what an Arithmetic Sequence looks like graphically.
3. I understand what a Geometric Sequence looks like graphically.

## Warm Up:

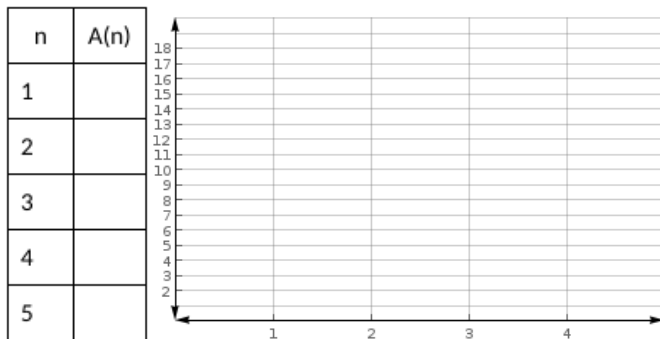
Remember Amy from Lesson 3.1.2. She gave us 4 different recursive formulas to play with. The formulas are listed here for your convenience. In this warm up you will need to use everything you've learned from the previous 2 lessons.

For each formula do the following:

1. Complete the table.
2. Plot the points from the table onto the graph.
3. Use your table or your graph to help you write an explicit formula.

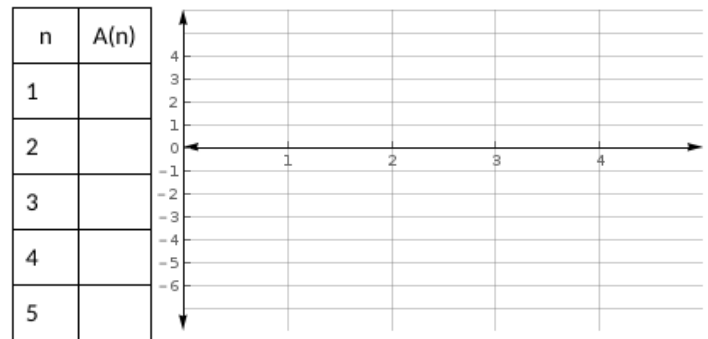
### Formula 1

$$A(n+1) = A(n) + 3 \text{ for } n \geq 1 \text{ and } A(1) = 5$$



### Formula 2

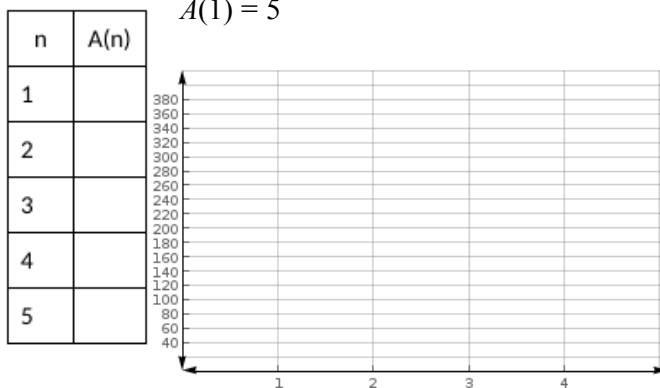
$$A(n+1) = A(n) - 3 \text{ for } n \geq 1 \text{ and } A(1) = 5$$



### Formula 3

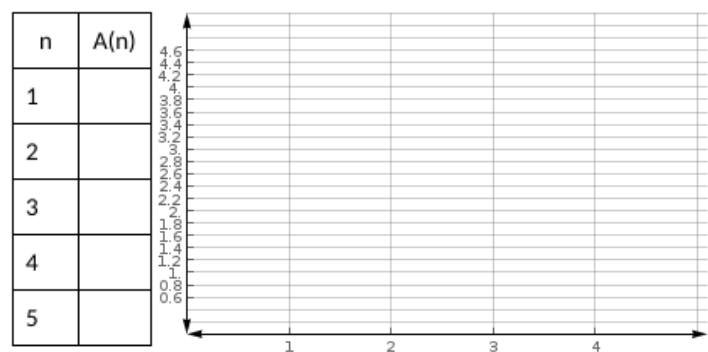
$$A(n+1) = A(n) \cdot 3 \text{ for } n \geq 1 \text{ and } A(1) = 5$$

$$A(1) = 5$$



### Formula 4

$$A(n+1) = A(n) \div 3 \text{ for } n \geq 1 \text{ and } A(1) = 5$$



After you have completed these three steps for all four formulas, answer these questions:

1. What do you notice about the graphs of formula 1 and formula 2?
2. What do you notice about the graphs of formula 3 and formula 4?

## Vocabulary

Write a definition for the following terms. Use the formulas from the warm up as examples.

### 1. Arithmetic Sequence

a. Definition:

b. Example 1:

c. Example 2:

### 2. Geometric Sequence

a. Definition:

b. Example 1:

c. Example 2:

## Practice 1

The table below gives different sequences. Use the sequence to fill in the rest of the table.

The first two are already filled in as a guide.

Sequence	Pattern	Type of Sequence	Recursive Formula	Explicit Formula
5, 8, 11, 14, ...	add 3	Arithmetic	$A(n+1) = A(n) + 3$ $A(1) = 5$	$A(n) = 5 + 3(n-1)$ or $A(n) = 3n + 2$
$5, \frac{5}{3}, \frac{5}{9}, \frac{5}{27}, \frac{5}{81}, \dots$	multiply $\frac{1}{3}$ (divide 3)	Geometric	$A(n+1) = A(n) \cdot \frac{1}{3}$ $A(1) = 5$	$A(n) = 5 \cdot \left(\frac{1}{3}\right)^{n-1}$
-2, 2, 6, 10, ...				
2, 4, 8, 16, ...				
2, -3, -8, -13, ...				

## Exit Ticket

1. Write the first 3 terms in the following sequences. Identify them as arithmetic or geometric.

a.  $A(n+1) = A(n) - 5$  for  $n \geq 1$  and  $A(1) = 9$

b.  $A(n+1) = \frac{1}{2}A(n)$  for  $n \geq 1$  and  $A(1) = 4$

c.  $A(n+1) = A(n) \div 10$  for  $n \geq 1$  and  $A(1) = 10$

2. Identify each sequence as arithmetic or geometric. Explain your answer, and write an explicit formula for the sequence.

a. 14, 11, 8, 5, ...

b. 2, 10, 50, 250, ...

c.  $-\frac{1}{2}, -\frac{3}{2}, -\frac{5}{2}, -\frac{7}{2}, \dots$