*AAT Name: Key

Chapter 10: Arithmetic & Geometric Sequences and Series (IC) Date: _____ Period: _____

1. For each sequence, identify the next two terms. Write an explicit and recursive rule to generate the sequence.

a. 4, 9, 14, 19, ... 24, 29

arithmetic

recursive

$a_{n+1} = a_n + 5$

explicit

$a_n = a_1 + (n-1)d$

$= 4 + (n-1)5$

$= 4 + 5n - 5$

$a_n = 5n - 1$

b. 2, 8, 32, 128, ... 512, 2048

geometric

recursive

$a_{n+1} = a_n * 4$

explicit

$a_n = a_1 r^{n-1}$

$a_n = 2 \cdot 4^{n-1}$

c. 1, 1, 2, 3, 5, ... (Hint: This is a special sequence...can you name it and write a recursive rule?)

Fibonacci Sequence

$a_{n+1} = a_n + a_{n-1}$

2. Determine if the following sequences are arithmetic or geometric. Write an explicit and recursive formula for each.

a. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$

geometric

$a_{k+1} = a_k \cdot \frac{1}{2}$: R

$a_n = a_1 r^{n-1}$

$1 \cdot \frac{1}{2}^{n-1}$: E

b. -7, -4, -1, 2, ...

arithmetic

$a_n = -7 + 3(n-1)$

$= -7 + 3n - 3$

$a_n = -10 + 3n$: E

$a_{n+1} = a_n + 3$: R

c. 100, 87, 74, 61, ...

arithmetic

$a_n = 100 - 13(n-1)$

$= 100 - 13n + 13$

$a_n = 113 - 13n$: E

$a_{k+1} = a_k - 13$: R

3. For each sequence, write an explicit formula and then calculate the specified sum.

a. 2, 9, 16, 23, ...; sum of the first 18 terms

$a_n = 2 + 7(n-1)$

$= 2 + 7n - 7$

$a_n = 7n - 5$

$S_n = \frac{n}{2}(a_1 + a_n)$

$S_{18} = \frac{18}{2}(2 + 121) = 1107$

b. -6, -2, 2, 6, ...; sum of the first 21 terms

$a_n = -6 + 4(n-1)$

$= -6 + 4n - 4$

$a_n = 4n - 10$

$S_{21} = \frac{21}{2}(-6 + 74) = 714$

c. 45, 36, 27, 18, ...; sum of the first 11 terms

$a_n = 45 - 9(n-1)$

$= 45 - 9n + 9$

$a_n = -9n + 54$

$S_{11} = \frac{n}{2}(a_1 + a_n)$

$= \frac{11}{2}(45 + -45)$

$= \frac{11}{2}(0)$

$= 0$