Name: _____ Date: _____

**Unit 13 Review: Sequences** Algebra I

**Explicit Sequence Formulas**

Arithmetic: $\boldsymbol{a_n = a_1 + (n-1)d}$ Geometric: $\boldsymbol{a_n = a_1 \cdot r^{n-1}}$

Determine and state whether each sequence is **arithmetic**, **geometric** or **neither**. If it is arithmetic, state the **common difference (*d*)**. If it is geometric, state the **common ratio (*r*)**. Find the **next three terms** in each sequence.

| | |
|---|---|
| 1) 5, 17, 29, 41, … | 2) 3, 9, 27, … |
| 3) 256, 128, 64, … | 4) 21, 16, 11, 6, … |
| 5) 25, 5, 1, … | 6) -40, -32, -24, -16, … |
| 7) 1, -4, 16, -64, … | 8) 150, 140, 120, 90, … |
| 9) -12, -5, 2, 9, … | 10) 107, 101, 95, 89, … |
| 11) 36, 6, 1, $\frac{1}{6}$, … | 12) -1, 1, -1, 1, -1, … |

**For each arithmetic sequence, write an explicit equation for the *n*th term in the sequence.**

| | |
|---|---|
| 13) 35, 32, 29, 26, … | 14) 9, 14, 19, 24, … |
| 15) -3, -1, 1, 3, … | 16) -30, -40, -50, -60, … |

**For each geometric sequence, write an explicit equation for the *n*th term in the sequence.**

| | |
|---|---|
| 17) -1, 6, -36, 216, … | 18) -3, -15, -75, -375, … |
| 19) 2, $\frac{1}{2}, \frac{1}{8}, \frac{1}{32}$, … | 20) -4, -12, -36, -108, … |

**Write an explicit equation for the *n*th term of each sequence, and use it to find the indicated term.**

| | |
|---|---|
| 21) The $20^{th}$ term of 28, 25, 22, 19, … | 22) The $10^{th}$ term of -3, -9, -27, -81, … |
| 23) The $7^{th}$ term of 4, 2, 1, … | 24) The $15^{th}$ term of -6, -1, 4, 9, … |

**Use the recursive formula given, to find the first four terms of each sequence.**

| | |
|---|---|
| 25) $a_n = a_{n-1} \cdot (-5)$, and $a_1 = 1.5, n \geq 2$ | 26) $a_{n+1} = a_n - 8$, and $a_1 = -20, n \geq 1$ |
| 27) $f(n) = f(n-1) + 4$, and $a_5 = 10, n \geq 2$ | 28) $f(n+1) = 3f(n)$, and $a_6 = 972, n \geq 1$ |

**Write at least 2 recursive formulas for each sequence.**

| | |
|---|---|
| 29) 2, 7, 12, 17, … | 30) 32, 16, 8, 4, … |

31) If a sequence is defined recursively by $f(0) = 7$ and $f(n+1) = 5f(n) + 2$ for $n \geq 0$, then $f(3)$ is equal to what number?

32) If $f(1) = 2$ and $f(n) = 3f(n-1) - 8$, then what does $f(4)$ equal?

33) The fourth term of an arithmetic sequence is 15 and the sixth term is 25. If the first term is $a_1$, what is an explicit equation for the *n*th term of this sequence?

34) A chain e-mail instructs the recipient to forward the e-mail to four more people. The table shows the number of rounds of sending the e-mail and the number of new e-mails generated. Write an explicit equation for the *n*th term of the sequence. How many emails would be sent round 15?

| Number of rounds sending e-mail, *n* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Number of new e-mails generated, $a_n$ | 1 | 4 | 16 | 64 |

35) A basketball is dropped from a height of 20 feet. It bounces $\frac{1}{2}$ of its height after each bounce.

a) What kind of sequence will the pattern generate?

b) Write an explicit equation for the *n*th term of the sequence.

c) Sketch a graph to show the relationship between the number of bounces and the height of the ball and identify the type of function that best describes the scenario?

36) Grace is on the swim team and is training for the upcoming season. Her coach suggests that she start keeping track of her times. They can be represented in the table below.

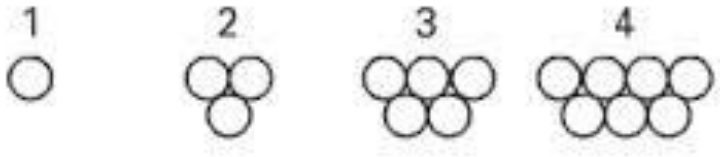
| Week | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Time (minutes) | 8.15 | 7.8 | 7.45 | 7.1 |

a) Write a function to represent the arithmetic sequence.

b) Sketch a graph to show the relationship between the number of weeks and Grace's times, and identify the type of function that best describes the scenario?

c) Grace is excited to see how low her time will get if she keeps improving. However, do you think the graph will accurately predict her time improvement? Why or Why not?

37) Write an explicit equation for the *n*th term of the sequence and use it to find the $20^{th}$ term.




38) Write an explicit equation for the *n*th term of the sequence and use it to find the number of squares in stage 10.