Unit 1 Study Guide **Name:** _____

Matching: Classify each function on the left with its description on the right.

D 1. $a_n = \frac{5}{3}(8)^{(n-1)}$

B 2. $a_n = \frac{6}{5}n - 1$ * arithmetic no exponent

C 3. $a_n = 6 \cdot a_{n-1}, a_1 = 2$

a. Arithmetic, Recursive

b. Arithmetic, Explicit

c. Geometric, Recursive

d. Geometric, Explicit

Recursive needs A_1

Matching: Match each sequence on the left with a formula on the right.

C 4. $3, -5, -13, -21$ A

B 5. $4,\ 20,\ 100,\ 500$

D 6. $36, 18,\ 9, 4.5, \ldots$

a. $a_n = 3(8)^{n-1}$ X8

b. $a_n = 5 \cdot a_{n-1}, a_1 = 4$

c. $a_n = -8n + 11$

d. $a_n = 36\left(\frac{1}{2}\right)^{(n-1)}$

$3(8)^{1-1} = 3$

$3(8)^{2-1} = 24$

For each table below, determine if the sequence is **arithmetic** or **geometric**. Then tell what the **constant ratio** or **common difference** is. **Create** the **recursive** for each.

7.

Term Number	Value
0	4
1	9
2	14
3	19

Arith +5 $A_1 = 9$ $A_n = A_{n-1} + 5$

Exp $4 + 5n$

8.

Term Number	Value
2	16
3	32
4	64
5	128

Geometric X2 $A_1 = 8$ $A_n = 2(A_{n-1})$ $A_n = 8(2)^{n-1}$

9. Below is an *arithmetic* sequence. Complete the table with the missing values.

x	1	2	3	4	5
f(x)	8	21	34	47	60

+13 +13 +13 +13

$\frac{60-8}{5-1} = \frac{52}{4} = +13$

10. Find the following: $f(x) = -x - 10,\ g(x) = 3x^2 - 2x + 1$

a) $g(-4)$ b) $f(3)$

substituting

$g(-4) = 3(-4)^2 - 2(-4) + 1$

(a) 57

(b) $f(3) = -(3) - 10$

-13

11. Below is a *geometric* sequence. Complete the table with the missing values. Is that the only ratio that works? Why?

x	1	2	3	4	5
f(x)	8	24	72	216	648

3 only ratio btc odd jumps

×3 ×3 ×3 — 3 jumps

$r^3 = 27$ $\sqrt[3]{27} = 3$

$\frac{216}{8} = 27$

12. The first term in a sequence is 8. The sequence increases by 15 each time. What would be the recursive equation?

Arithmetic $A_1 = 8$ $A_n = A_{n-1} + 15$

13. The end of a spring is pulled as far back as it will go and then released. On the first bounce back, it extends 152 cm. On its second bounce back, it extends 76 cm. On its third bounce back, it extends 38 cm.

a. Is this scenario Arithmetic or Geometric? How do you know?

$r = \frac{1}{2}$ $\frac{76}{152} = \frac{1}{2}$

b. Create the recursive and explicit formulas.

Rec $A_1 = 152$ $A_n = \frac{1}{2}(A_{n-1})$

Exp $A_n = 152\left(\frac{1}{2}\right)^{n-1}$

c. How far does the spring extend on its 5th, 6th, and 7th bounce back?

9.5cm, 4.75cm, 2.375cm

X	Y
1	152
2	76
3	38
4	19
5	9.5
6	4.75
7	2.375

14. A large nursery starts on day 0 with 1400 lilies to sell. Every day, the number of lilies available decreases by 70. Write an explicit formula for the number of lilies available to sell, where n is the number of days. Then, find the number of lilies that can be sold on the 8th, 9th, and 10th day.

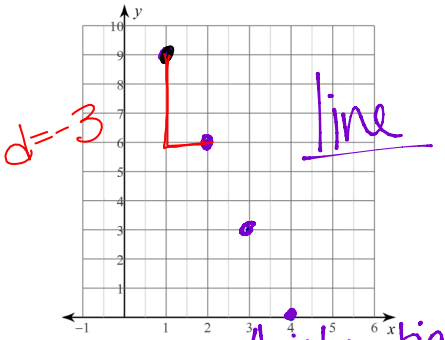
X	0	1	2
Y	1400	1330	1260

−70

$A_n = 1400 - 70n$

$1400 - 70(8)$

8 840
9 770
10 700



$d = -3$ line

15. Type of sequence: Arithmetic

16. Recursive: $A_1 = 9$ $A_n = A_{n-1} - 3$

17. Explicit: $A_n = 12 - 3n$

Sequence: 1, 4, 16, 64, ... ×4

18. Type of sequence: Geometric

19. Recursive: $A_1 = 1$ $A_n = 4(A_{n-1})$

20. Explicit: $A_n = 1(4)^{n-1}$

$A_1=-5$ $r=3$

21. Error Analysis: Who is correct?

Callie and Joseph are trying to find the common ratio, recursive formula, and explicit formula for the sequence $-5, -15, -45, -135, \ldots$ Their answers are provided. Is either one correct?

Callie's Work	Joseph's Work
Common ratio: $\frac{-15}{-5} = 3$ ✓	Common ratio: $\frac{-15}{-5} = 3$ ✓
Explicit Formula: $a_n = -5(3)^{(n-1)}$ ✓	Explicit Formula: $a_n = 3(-5)^{(n-1)}$ swap A_1 and r
Recursive Formula: $a_n = -3 \cdot a_{n-1}$ $a_1 = -5$ ratio is 3 not −3	Recursive Formula: $a_n = 3 \cdot a_{n-1}$ ✓ $a_1 = -5$ ✓

Explanation: swap A_1 & r is Joes work

22. The distance (in inches) that a free-falling object falls in each second, starting with the first second, is given by the geometric progression 0.5, 1.5, 4.5, 13.5,…Create the explicit and recursive function for this situation. Find the distance that the object falls on the 20th and 45th second.

Exp $A_n = 0.5(3)^{n-1}$

$0.5(3)^{20-1} = 581130733.5$

$0.5(3)^{45-1} = 4.92 \times 10^{20}$

Rec $A_1 = 0.5$ $A_n = 3(A_{n-1})$

$\frac{1.5}{0.5} = 3$ $r = 3$

X	Y
1	0.5
2	1.5
3	4.5
4	13.5

23. **Let's change back and forth between forms!**

Given the recursive definition, write the explicit definition.	Given the explicit definition, write the recursive definition.
$a_1 = 4$ $a_n = 3 \cdot a_{n-1}$ $4(3)^{n-1}$	$a_n = 5(2)^n$ $A_1 = 5(2)^1 = 10$ $A_1 = 10$ $A_n = 2(a_{n-1})$
$a_1 = 5$ $a_n = -2 \cdot a_{n-1}$ $5(-2)^{n-1}$	$a_n = 200\left(\frac{1}{2}\right)^n$ $A_1 = 200(\frac{1}{2})^1 = 100$ $A_1 = 100$ $A_n = \frac{1}{2}(a_{n-1})$