Lesson 8 What Comes Next? What Comes Later?

A Practice Understanding Task

For each of the following tables,

- describe how to find the next term in the sequence,
- write a recursive rule for the function,
- describe how the features identified in the recursive rule can be used to write an explicit rule for the function, and
- write an explicit rule for the function.
- identify if the function is arithmetic, geometric or neither

Example:

x	y
0	5
1	8
2	11
3	14
4	?
...	...
n	?

- To find the next term: add 3 to the previous term
- Recursive rule: $f(0) = 5, f(n) = f(n-1) + 3$
- To find the n^{th} term: start with 5 and add 3 n times
- Explicit rule: $f(n) = 5 + 3n$
- Arithmetic , geometric, or neither? Arithmetic

Function A

x	y
1	5
2	10
3	20
4	40
5	?
...	...
n	?

1. How to find the next term: multiply by 2
2. Recursive rule: $a_1 = 5 \quad a_n = a_{n-1} \cdot 2$
3. To find the n^{th} term: start at 5 and multiply by 2
4. Explicit rule: $a_n = 5(2)^{n-1}$
5. Arithmetic, geometric, or neither? geometric

Function B

6. How to find the next term: subtract 9
7. Recursive rule: $a_1 = -8$ $a_n = a_{n-1} - 9$
8. To find the n^{th} term: start at -8 then take away 9
9. Explicit rule: $a_n = -8 + (n-1)(-9)$
10. Arithmetic, geometric, or neither? Arithmetic

x	y
1	-8
2	-17
3	-26
4	-35
5	-44
6	-53
...	...
n	

Function C

11. To find the next term: multiply by 3
12. Recursive rule: $a_1 = 2$ $a_n = a_{n-1} \cdot 3$
13. To find the n^{th} term: multiply by 3, start at 2
14. Explicit rule: $a_n = 2(3)^{n-1}$
15. Arithmetic, geometric, or neither? geometric

x	y
1	2
2	6
3	18
4	54
5	162
6	486
...	...
n	

Function D

16. To find the next term: add 12
17. Recursive rule: $a_1 = 3$ $a_n = a_{n-1} + 12$
18. To find the n^{th} term: start at 3, add 12
19. Explicit rule: $a_n = 3 + (n-1)(12)$
20. Arithmetic, geometric, or neither? arithmetic

x	y
1	3
2	15
3	27
4	39
5	51
6	?
...	...
n	?

Function E

21. To find the next term: add 3/5
22. Recursive rule: $a_0 = 1 \quad a_n = a_{n-1} + 3/5$
23. To find the n^{th} term: start at 1, add 3/5
24. Explicit rule: $a_n = 1 + n(3/5)$
25. Arithmetic, geometric, or neither? arithmetic

x	y	
0	1	
1	$1\frac{3}{5}$	8/5
2	$2\frac{1}{5}$	11/5
3	$2\frac{4}{5}$	14/5
4	$3\frac{2}{5}$	
5	4	
...	...	
n		

* **Function F** Not on test

26. To find the next term: add next odd value to previous term
27. Recursive rule: $a_0 = 3 \quad a_n = a_{n-1} + (2n+1)$
28. To find the n^{th} term: square n and add 3
29. Explicit rule: $a_n = n^2 + 3$
30. Arithmetic, geometric, or neither? Neither

x	y	
0	3	
1	4	>+1
2	7	>+3
3	12	>+5
4	19	>+7
5	?	
...	...	
n	?	

Function G

31. To find the next term: multiply by 1/5
32. Recursive rule: $a_1 = 10 \quad a_n = a_{n-1} \cdot 1/5$
33. To find the n^{th} term: multiply by 1/5, start at 10
34. Explicit rule: $a_n = 10(1/5)^{n-1}$
35. Arithmetic, geometric, or neither? geometric

x	y
1	10
2	2
3	$\frac{2}{5}$
4	$\frac{2}{25}$
5	$\frac{2}{125}$
6	$\frac{2}{625}$
...	...
n	

Lesson 8

Name

Period

Date

READY

Topic: Common Ratios

Find the common ratio for each geometric sequence.

1. 2, 4, 8, 16... $r = 2$

2. $\frac{1}{2}$, 1, 2, 4, 8... $r = 2$

3. -5, 10, -20, 40... $r = -2$

4. 10, 5, 2.5, 1.25... $r = 1/2$

SET

Topic: Recursive and explicit equations

Fill in the blanks for each table; then write the recursive and explicit equation for each sequence.

5. Table 1

x	1	2	3	4	5
y	5	7	9		

Recursive: $a_1 = 5 \quad a_n = a_{n-1} + 2$ Explicit: $a_n = 5 + (n-1)(2)$

6. Table 2

x	y
1	-2
2	-4
3	-6
4	-8
5	-10

Recursive: $a_1 = -2 \quad a_n = a_{n-1} - 2$

Explicit: $a_n = -2 + (n-1)(-2)$

7. Table 3

x	y
1	3
2	9
3	27
4	81
5	243

Recursive: $a_1 = 3 \quad a_n = a_{n-1} \cdot 3$

Explicit $a_n = 3(3)^{n-1}$

8. Table 4

x	y
1	27
2	9
3	3
4	1
5	1/3

Recursive: $a_1 = 27 \quad a_n = a_{n-1} \cdot 1/3$

Explicit: $a_n = 27(1/3)^{n-1}$