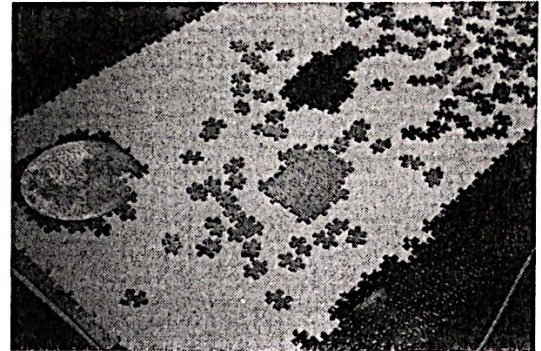


1.8 What Comes Next? What Comes Later?

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



CC BY Hiroaki Maeda
<https://flic.kr/p/6R8oDk>

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

1. How to find the next term: multiply by 2
2. Recursive rule: $f(1) = 5$ $f(n) = 2f(n-1)$
3. To find the n^{th} term: Start at 5 and multiply by 2 $(n-1)$ times
4. Explicit rule: $f(n) = 5(2)^{(n-1)}$
5. Arithmetic, geometric, or neither? Geometric

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

$\downarrow \times 2$

Function B

6. How to find the next term: -9 from the previous term
7. Recursive rule: $f(1) = -8$ $f(n) = f(n-1) - 9$
8. To find the n^{th} term: Start at -8 and subtract 9 (n-1) times
9. Explicit rule: $f(n) = -8 - 9(n-1)$
10. Arithmetic, geometric, or neither? Arithmetic

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

↓ -9

Function C

11. To find the next term: multiply by 3
12. Recursive rule: $f(1) = 2$ $f(n) = 3f(n-1)$
13. To find the n^{th} term: Start at 2 and multiply by 3 (n-1) times
14. Explicit rule: $f(n) = 2(3)^{n-1}$
15. Arithmetic, geometric, or neither? Geometric

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

↓ · 3

Function D

16. To find the next term: Add 12 to the previous term
17. Recursive rule: $f(1) = 3$ $f(n) = f(n-1) + 12$
18. To find the n^{th} term: Start at 3 and add 12 (n-1) times
19. Explicit rule: $f(n) = 3 + 12(n-1)$
20. Arithmetic, geometric, or neither? Arithmetic

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

↓ + 12

Function E

21. To find the next term: Add $\frac{3}{5}$ to the previous term
22. Recursive rule: $f(0) = 1$ $f(n) = f(n-1) + \frac{3}{5}$
23. To find the n^{th} term: Start at 1 and add $\frac{3}{5}$ n times
24. Explicit rule: $f(n) = 1 + \frac{3}{5}n$
25. Arithmetic, geometric, or neither? _____

x	y
0	1
1	$1\frac{3}{5}$
2	$2\frac{1}{5}$
3	$2\frac{4}{5}$
4	$3\frac{2}{5}$
5	4
...	...
n	

$\downarrow + \frac{3}{5}$

*** Function F**

26. To find the next term: add $1+2n$ to the previous term
27. Recursive rule: $f(0) = 3$ $f(n) = f(n-1) + (2n+1)$
28. To find the n^{th} term: Start at 3 and add $(2n+1)$ n times
29. Explicit rule: $f(n) = n^2 + 3$
30. Arithmetic, geometric, or neither? Neither

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

$1, 3, 5, 7$
 $\downarrow +2 \downarrow +2 \downarrow +2$

$\left. \begin{array}{l} +1 \\ +3 \\ +5 \\ +7 \end{array} \right\} 1+2n$

Function G

31. To find the next term: multiply the previous term by $\frac{1}{5}$
32. Recursive rule: $f(1) = 10$ $f(n) = \frac{1}{5}f(n-1)$
33. To find the n^{th} term: Start at 10 and multiply by $\frac{1}{5}$ $(n-1)$ times
34. Explicit rule: $f(n) = 10\left(\frac{1}{5}\right)^{n-1}$
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	

$\downarrow \times \frac{1}{5}$