

Notes 1.7 – Sequences

Warmup

Complete each table and then write the equations for the info in the table.

Term	Value	Change	
1	3		
2	12	•4	
3	48	•4	
4	192		
5	768		
6	3072		

Recursive Equation:

new = previous • 4 $f(n) = 4 \cdot f(n-1)$
 first term is 3 $f(1) = 3$

Explicit Equation:

$$f(n) = \frac{3}{4}(4)^n$$

What kind of sequence?

geometric

Term	Value	Change	
1	2916		
2	972	• $\frac{1}{3}$	
3	324	• $\frac{1}{3}$	
4	108		
5	36		
6	12		

Recursive Equation:

new = previous • $\frac{1}{3}$ $f(n) = \frac{1}{3} \cdot f(n-1)$
 first term is 2916 $f(1) = 2916$

Explicit Equation:

$$f(n) = 8748 \left(\frac{1}{3}\right)^n$$

What kind of sequence?

geometric

Term	Value	Change	
1	23		
2	19	-4	
3	15	-4	
4	11	-4	
5	7		
6	3		

Recursive Equation:

new = previous - 4 $f(n) = f(n-1) - 4$
 first term is 23 $f(1) = 23$

Explicit Equation:

$$f(n) = -4n + 27$$

What kind of sequence?

arithmetic

Lesson – Writing Equations from a variety of situations

Two terms of an arithmetic sequence are given, create a table then find the recursive and explicit equations.

a) $f(2) = 20$ and $f(3) = 12$

n	0	1	2	3	4
f(n)	36	28	20	12	4

Recursive:

new = previous - 8 $f(n) = f(n-1) - 8$
 first term is 36 $f(0) = 36$

Common difference: -8

Explicit:

$$f(n) = -8n + 36$$

b) $f(5) = 3.7$ and $f(6) = 8.7$

n	0	1	2	3	4	5	6
f(n)	-21.3	-16.3	-11.3	-6.3	-1.3	3.7	8.7

Recursive:

new = previous - 5
 first term is -21.3
 $f(n) = f(n-1) - 5$

Common difference: -5

Explicit: $f(0) = -21.3$

$$f(n) = -5n - 21.3$$

Two terms of a geometric sequence are given, find the recursive and explicit equations.

c) $f(3) = 45$ and $f(4) = 15$

n	0	1	2	3	4
f(n)	1215	405	135	45	15

Recursive:

new = previous $\cdot \frac{1}{3}$ $f(n) = \frac{1}{3} \cdot f(n-1)$
 first term is 1215 $f(0) = 1215$

Common ratio: $\cdot \frac{1}{3}$

Explicit:

$$f(n) = 1215 \left(\frac{1}{3}\right)^n$$

d) $f(4) = 72$ and $f(5) = 432$

n	0	1	2	3	4	5
f(n)	$\frac{1}{18}$	$\frac{1}{3}$	2	12	72	432

Recursive:

new = previous $\cdot 6$
 first term is $\frac{1}{18}$
 $f(n) = 6 \cdot f(n-1)$ $f(0) = \frac{1}{18}$

Common ratio: $\cdot 6$

Explicit:

$$f(n) = \frac{1}{18} (6)^n$$

Decide if each situation is arithmetic or geometric, then make a table and write the recursive and explicit equations to model the situation.

- e) Scott decides to add running to his exercise routine and runs a total of one mile his first week. He plans to double the number of miles he runs each week.

weeks	1	2	3	4	5
miles	1	2	4	8	16

Arithmetic or Geometric

Recursive:
new = previous $\cdot 2$
first term is 1
 $f(n) = 2 \cdot f(n-1)$
 $f(1) = 1$

Explicit:

$$f(n) = \frac{1}{2}(2)^n$$

- f) Vanessa has \$60 to spend on rides at the state fair. Each ride costs \$4.

Rides	0	1	2	3	4
\$ left	60	56	52	48	44

Arithmetic or Geometric

Recursive:
new = previous $- 4$
first term is 60
 $f(n) = f(n-1) - 4$
 $f(0) = 60$

Explicit:

$$f(n) = -4n + 60$$