

Notes 1.5 – Geometric Sequences

Warmup

For each given sequence:

- complete the table
- write the recursive equation
- write the explicit equation

Term	Value	Change	Sum
1	3		3
2	8	+5	3+5
3	13	+5	3+5+5
4	18	+5	3+5+5+5
5	23	+5	
6	28	+5	
7	33	+5	
8	38	+5	

0 -2

Recursive: $\text{new} = \text{previous} + 5$
 first term is 3
 $f(n) = f(n-1) + 5$
 $f(1) = 3$

Explicit:

$$f(n) = 5n - 2$$

Term	Value	Change	Sum
0	11		11
1	9	-2	11-2
2	7	-2	11-2-2
3	5	-2	11-2-2-2
4	3	-2	
5	1	-2	
6	-1	-2	
7	-3	-2	

Recursive: $\text{new} = \text{previous} - 2$
 first term is 11
 $f(n) = f(n-1) - 2$
 $f(0) = 11$

Explicit:

$$f(n) = -2n + 11$$

Term	Value	Change	Sum
1	3		3
2	1.5	-1.5	3-1.5
3	0	-1.5	3-1.5-1.5
4	-1.5	-1.5	3-1.5-1.5-1.5
5	-3	-1.5	
6	-4.5	-1.5	
7	-6	-1.5	
8	-7.5	-1.5	

0 4.5

Recursive: $\text{new} = \text{previous} - 1.5$
 first term is 3
 $f(n) = f(n-1) - 1.5$
 $f(1) = 3$

Explicit:

$$f(n) = -1.5n + 4.5$$

Lesson

Word	Meaning/Notation	Example
Geometric Sequence	A pattern that increases or decreases by multiplying a specific value, either whole or fraction	81, 27, 9, 3, ... multiply by $\frac{1}{3}$ to get next term
Common Ratio	The amount that is repeatedly multiplied in a geometric sequence	1, 5, 25, 125,5

Growing More Dots Problem																		
Visual																		
Table (one type)	<table border="1"> <tr> <td>Time</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Dots</td> <td>3</td> <td>6</td> <td>12</td> <td>24</td> <td>48</td> </tr> </table>	Time	0	1	2	3	4	Dots	3	6	12	24	48	<table border="1"> <tr> <td>Independent Variable</td> <td>Data</td> </tr> <tr> <td>Dependent Variable</td> <td>Data</td> </tr> </table>	Independent Variable	Data	Dependent Variable	Data
Time	0	1	2	3	4													
Dots	3	6	12	24	48													
Independent Variable	Data																	
Dependent Variable	Data																	
Graph		<p>output Dependent Variable</p> <p>Independent Variable input</p>																
Words/Description	We start with 3 dots that form a triangle, each minute the number of dots at each spot doubles.	Describe the pattern using context and explaining what the rule is.																

Complete the table and find the common ratio for each sequence.

Term	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Value	2	4	8	16	32	64	128	256
Change		$\cdot 2$	$\cdot 2$	$\cdot 2$	$\cdot 2$	$\cdot 2$	$\cdot 2$	$\cdot 2$

Common ratio:

$$\cdot 2$$

Term	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Value	160	80	40	20	10	5	$2\frac{1}{2}$	$1\frac{1}{4}$
Change		$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$	$\cdot \frac{1}{2}$

Common ratio:

$$\cdot \frac{1}{2}$$

What have you noticed is different between arithmetic and geometric sequences in any representation? (compare the notes from 1.3 and today to help you)

This could be a test question.