

☺ 1.4 – Graphing Sequences ☺

Objectives:

4. Develop and explore graphs and sequences.
5. Recognize and use multiple representations of sequences.
6. Focus on graphs of recursive models for data.



Investigation Match Them Up

Match each table with a recursive formula and a graph that represent the same sequence. Think about similarities and differences between the sequences and how these similarities and differences affect the tables, formulas, and graphs.

1. B iv

n	u_n
0	8
1	4
3	1
6	0.125
9	0.015625

2. C vi

n	u_n
0	0.5
1	1
2	2
3	4
4	8

3. F iii

n	u_n
0	-2
1	1
2	2.5
4	3.625
5	3.8125

4. D v

n	u_n
0	-2
2	2
5	8
7	12
10	18

5. A ii

n	u_n
0	8
1	6
3	2
5	-2
7	-6

6. E i

n	u_n
0	-4
1	-4
2	-4
4	-4
8	-4

A. $u_0 = 8$ ii

$$u_n = u_{n-1} - 2 \quad \text{where } n \geq 1$$

B. $u_0 = 8$ iv

$$u_n = 0.5u_{n-1} \quad \text{where } n \geq 1$$

C. $u_0 = 0.5$ vi

$$u_n = 2u_{n-1} \quad \text{where } n \geq 1$$

D. $u_0 = -2$ v

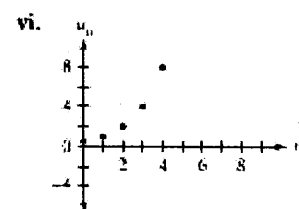
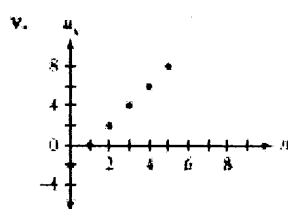
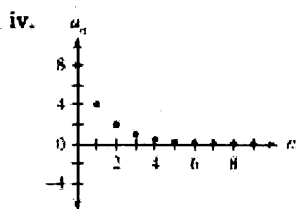
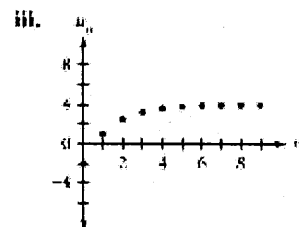
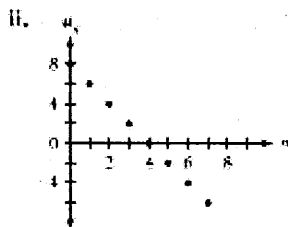
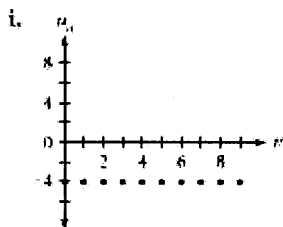
$$u_n = u_{n-1} + 2 \quad \text{where } n \geq 1$$

E. $u_0 = -4$ i

$$u_n = u_{n-1} \quad \text{where } n \geq 1$$

F. $u_0 = -2$ iii

$$u_n = 0.5u_{n-1} + 2 \quad \text{where } n \geq 1$$



Linear in the shape of a line or represented by a line, found by adding a constant value each time

Nonlinear rate of change is not constant, the graph is not a line, varying rate of change

What kind of graph does an arithmetic sequence make? *LINEAR*

What kind of graph does a geometric sequence make? *NON-LINEAR*

(approaches x-axis if it has a limit)

What kind of graph does a shifted geometric sequence make? *NON-LINEAR*

(if it has a limit, approaches horizontal line that is not x-axis)

Example 1:

Imagine the graphs of the sequences generated by these recursive formulas. Describe each graph using exactly three of these terms: arithmetic, geometric, shifted geometric, linear, nonlinear, increasing, decreasing.

a. $t_0 = 50$
 $t_n = t_{n-1} - 10$ where $n \geq 1$

*ARITHMETIC
LINEAR
DECREASING*

b. $a_0 = 1000$
 $a_n = 0.7a_{n-1} + 100$ where $n \geq 1$

*SHIFTED GEOMETRIC
NON-LINEAR
DECREASING*

c. $u_0 = 35$
 $u_n = u_{n-1} \cdot 1.75$ where $n \geq 1$

*GEOMETRIC
NONLINEAR
INCREASING*

d. $t_0 = 150$
 $t_n = (1 - 0.15)t_{n-1}$ where $n \geq 1$

*GEOMETRIC
NONLINEAR
DECREASING*