

Algebra 1
Geometric Sequences

Name: _____

Date: _____

Warm Up

Remember: Arithmetic Sequences

Sequences

Are the following arithmetic sequences?
If so, what is their common difference?

Arithmetic

Recursive: $a_1 = \underline{\hspace{1cm}}$; $a_n = a_{n-1} + d$

Explicit: $a_n = a_1 + d(n - 1)$

1. 12, 6, 0, -6, -12, ... _____
2. -4, -6, -9, -11, -13 ... _____
3. Write the recursive formula given the following sequence: 20, 15, 10, 5, ... _____
4. Given the recursive formula, write the explicit formula and find the following terms:
 $a_1 = 12$, $a_n = a_{n-1} + 7$
Explicit formula: _____ $a_2 =$ _____ $a_6 =$ _____ $a_9 =$ _____
5. Remember: An arithmetic sequence can be modeled by a _____ function.

Find the next three terms in the following sequences:

1. 2, 6, 18, 54, _____, _____, _____
2. -3, -9, -27, _____, _____, _____

❖ How are these sequences different from arithmetic sequences?

❖ To get to the next term in a _____ sequence, you must

_____ by a constant.

❖ This constant is called the _____.

A _____ is a list of terms that are multiplied by a _____ to get the next term.

Find the common ratio of the following geometric sequences:

3. 4, 16, 64, 256, ... common ratio: _____
4. -6, 12, -24, 48, ... common ratio: _____
5. 448, 112, 28, 7, ... common ratio: _____
6. -288, -144, -72, -36, ... common ratio: _____
7. 2000, -200, 20, -2, ... common ratio: _____
8. 17, -17, 17, -17, ... common ratio: _____

Term # (Position in	1	2	3	4	5
Term Value	2	4	8	16	32

Let's look at a geometric sequence graphed.

Plot the points listed in the chart above.

What is the common ratio for the sequence above?

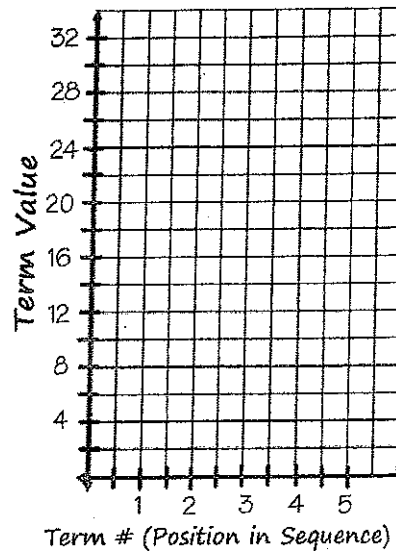
What kind of graph is formed?

Growth or decay?

Should we connect the dots? Why or why not?

Domain:

Range:



So, a geometric sequence CAN be modeled by an _____ function.

The recursive formula for geometric sequences is similar to the recursive formula for arithmetic sequences.

Recursive Formula: $a_1 = \underline{\hspace{2cm}}, a_n = a_{n-1} \cdot r$

_____ is the first term in the sequence _____ is the term number

_____ is the common ratio _____ is the n^{th} term in the sequence

Write the recursive formula for the following sequences.

1. $-4, 8, -16, 32, \dots$ _____ 2. $25, 5, 1, \frac{1}{5}, \dots$ _____

Find the indicated terms given the recursive formula.

3. $a_1 = -6, a_n = a_{n-1} \cdot 6$ $a_2 = \underline{\hspace{2cm}}$ $a_3 = \underline{\hspace{2cm}}$ $a_5 = \underline{\hspace{2cm}}$

4. $a_1 = 32, a_n = a_{n-1} \cdot \frac{1}{2}$ $a_4 = \underline{\hspace{2cm}}$ $a_5 = \underline{\hspace{2cm}}$ $a_6 = \underline{\hspace{2cm}}$

The Explicit Rule for a Geometric Sequence: $a_n = a_1 \cdot (r)^{n-1}$

_____ is the first term in the sequence _____ is the term number

_____ is the common ratio _____ is the n^{th} term in the sequence

Write the first term, common ratio, and explicit formula for the following geometric sequences.

1. 4, 8, 16, 32,.....

$a_1 = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

$a_n = \underline{\hspace{4cm}}$

2. 68, 34, 17, 8.5,.....

$a_1 = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

$a_n = \underline{\hspace{4cm}}$

Write the explicit formula and find the given term for the following geometric sequence.

Explicit Formula
 $a_n = a_1 \cdot (r)^{n-1}$

3. 3, -9, 27, -81,.....

$a_1 = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

$a_n = \underline{\hspace{4cm}}$

$a_{10} = \underline{\hspace{4cm}}$

4. 24, -12, 6, -3,.....

$a_1 = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

$a_n = \underline{\hspace{4cm}}$

$a_7 = \underline{\hspace{4cm}}$

5. A geometric sequence is defined recursively by $a_1 = 1$; $a_n = a_{n-1} \cdot (-4)$.

Find the first 5 terms of the sequence:

Write an explicit formula to represent the sequence:

Find the 10th term:

6. A geometric sequence is defined recursively by $a_1 = 2187$; $a_n = a_{n-1} \cdot (1/3)$.

Find the first 5 terms of the sequence:

Write an explicit formula to represent the sequence:

Find the 9th term:

Geometric Sequence Word Problem

7. Drenna is participating in a read-a-thon. Her goal is to be reading 128 pages by the time the read-a-thon is over. Drenna reads 2 pages on the first day and then doubles the number of pages she reads every day.

a. Write the first four terms of the Geometric sequence.

b. Write the explicit formula for the Geometric sequence.

c. If the read-a-thon lasts for 8 days, will Drenna have reached her goal of reading 128 pages in a day? How many pages will she be reading on the 8th day?

Homework

Determine if the sequence is arithmetic or geometric.

1. 10, 30, 90, ... _____ 2. 8, 2, -4, -10, ... _____

3. -9, -2, 5, ... _____ 4. 625, 125, 25, ... _____

Geometric Sequences

Recursive: $a_1 = \underline{\hspace{1cm}}$; $a_n = a_{n-1} \cdot (r)$

Explicit: $a_n = a_1 \cdot (r)^{n-1}$

Find the first five terms given the first term and the common ratio.

5. $a_1 = 12$ common ratio: 2 _____

6. $a_1 = -320$ common ratio: $-\frac{1}{4}$ _____

For the following geometric sequences, find the common ratio and the missing terms.

7. -1, -7, -49, ... a. Common ratio: _____ b. $a_5 =$ _____ c. $a_8 =$ _____

8. 1024, 512, 256, ... a. Common ratio: _____ b. $a_5 =$ _____ c. $a_7 =$ _____

Write the recursive formula for the following sequences.

9. 99, 33, 11, ... _____ 10. 32, -128, 512, ... _____

Write the explicit formula for the following sequences.

11. -400, 80, -16, ... _____ 12. 3.5, 21, 126, ... _____

Given the following formulas, write the first four terms.

13. $a_1 = -81$; $a_n = a_{n-1} \cdot (\frac{1}{3})$

14. $a_n = 8(3)^{n-1}$

Given the following geometric explicit formulas, write the first term and common ratio, then find the given term.

15. $a_n = 3072(\frac{1}{4})^{n-1}$

16. $a_n = 3(-5)^{n-1}$

$a_1 =$ _____ $r =$ _____ $a_7 =$ _____

$a_1 =$ _____ $r =$ _____ $a_8 =$ _____

17. The PHS weight training record for the number of push-ups in one day is 507. Jordan wants to beat this record. On the first day, Jordan does one push-up. He then doubles the number of push-ups he does every day.

a. Write the first 4 terms of this geometric four sequence.

b. Write the explicit formula for the sequence.

c. Will Jordan beat the school record after 10 days? Explain.

18. The army is accepting Christmas gifts for kids in need. Their goal is to take 500 toys in one day. The army only receives three toys on the first day. However, on the third day they receive 27 toys.

a. How many toys did the army receive on the first days?

b. Write the explicit formula for the geometric

c. Will they reach their goal by day 6? How many toys will they take in on this day?