

learning focus:

- ✓ identify terms of arithmetic and geometric sequences using recursive and explicit formulas
- ✓ write a formula for the n^{th} term of arithmetic and geometric sequences

SEQUENCES MINI-UNIT 5 DAY TEKS-ALIGNED UNIT



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SEQUENCES PACING GUIDE

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Intro to Arithmetic Sequences	Explicit Formulas of Arithmetic Sequences	Mini-Quiz: Arithmetic Sequences	Intro to Geometric Sequences	Explicit Formulas of Geometric Sequences
Student Handout 1	Student Handout 2	Mini Quiz 1	Student Handout 3	Student Handout 4
Homework 1	Homework 2	Homework 3	Homework 4	Homework 5

Mini Quiz: Geometric Sequences

Sequences

Use the information to determine the number of terms in the sequence. Illustration to complete the table for

3	4

LEVEL 1 LEVEL 2 LEVEL 3 LEVEL 4

list of numbers. Each term in a sequence can be written as shown in the table below.

FUNCTION NOTATION

$f(n)$

is the

value of $f(4)$?

A MANEUVERING THE MIDDLE® RESOURCE

SEQUENCES



a 5 day TEKS-aligned unit
TEKS: A.12C, A.12D

ready-to-go, scaffolded
student materials

SEQUENCES MINI-UNIT

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SEQUENCES



a 5 day TEKS-aligned unit
TEKS: A.12C, A.12D

student friendly + real-world application

skill application

Unit: Sequences
Homework 3

Name _____
Date _____ Pd _____

INTRO TO GEOMETRIC SEQUENCES

Three students wrote geometric sequences as shown at the right. Use the sequences to answer 1-3.

TINA	JOSIAH	ANGEL
12, -24, 48, -96, ...	192, 96, 48, 24, ...	-3, 6, -12, 24, ...

1. Which students wrote sequences with the same common ratio? Give the common ratio.

2. Which sequence has a common ratio for a_3 ?

4. The recursive formula shown represents the following is NOT a true statement about the sequence.

a. The first term in the sequence is 6.
b. The common ratio of the sequence is 2.
c. Adding -5 to 6 will give you the value of the second term.
d. The third term in the sequence is 150.

Use the recursive formulas in 5-7 to write the first five terms of each geometric sequence.

5. $a_1 = 1$; $a_n = 8a_{n-1}$

6. $f(1) = 5$

8. For the geometric sequence below, find the common ratio and the missing term.

1,024, 256, ?, 16, 4, 1, ...

common ratio: _____ a_3 : _____

10. Label each sequence as arithmetic, geometric, or neither. Give the common ratio if applicable.

a. 8, 12, 18, 22, 28, ...
b. ...

Use the recursive formulas in 6-8 to write the first five terms of each geometric sequence.

6. $a_1 = 4$; $a_n = 2a_{n-1}$

7. $f(1) = 400$; $f(n) = \frac{1}{2}f(n-1)$

8. $a_1 = -1$; $a_n = -3a_{n-1}$

Use your knowledge of geometric sequences to answer 9-11.

9. Gabe wrote the recursive formula $a_n = 2a_{n-1} + 1$ to represent the sequence $\{-3, -6, -12, -24, \dots\}$. Describe Gabe's error and correct the formula.

11. A sequence is represented by the function $f(1) = 5$.

a. List the first five terms of the sequence.

b. Create a graph of the sequence. What relationship is shown on the graph?

12. Summarize the differences between geometric and arithmetic sequences by listing their characteristics in the table at the right.

13. Classify each sequence in the table as arithmetic, geometric, or neither. Give the common difference or common ratio in the last column.

SEQUENCE	
a. 21, 18, 15, 12, 9, ...	
b. 16, 8, 2, $1\frac{1}{4}$, ...	
c. -2, 12, -72, 432, ...	
d. -19, -17, -15, -13, -11, ...	
e. 144, 72, 36, 18, 9, ...	

Unit: Sequences
Student Handout 3

Name _____
Date _____ Pd _____

INTRO TO GEOMETRIC SEQUENCES

Now and Zen, a new yoga studio, offers members an incentive if they refer a friend within a week of joining the studio. The table shows the total number of studio memberships based on the number of weeks since opening.

WEEK	# MEMBERS
1	6
2	12
3	24
4	48

a. Record the total number of members each week as a list.

b. What patterns do you notice in the list terms?

c. If the pattern continues, how many members would you expect for week 5?

The list of members represents a _____ sequence described below.

GEOMETRIC SEQUENCE

- A sequence where the _____ between consecutive terms is constant.
- This constant _____ between terms is called the _____ ratio.

For each geometric sequence in 1-3, determine the common ratio and the next term.

1. 2, 8, 32, 128, ... common ratio: _____ a_5 : _____	2. 128, 64, 32, 16, 8, ... common ratio: _____ a_5 : _____	3. -1, 5, -25, ... common ratio: _____ a_4 : _____
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4. Jane wrote a geometric sequence where $a_1 = 2$ and the common ratio is 5. List the first four terms in Jane's sequence. Then, explain how you found the terms.

Any term of a geometric sequence can be found by _____ the previous term by the common ratio. This is represented by the recursive formula as shown at the right.

RECURSIVE FORMULAS: GEOMETRIC SEQUENCES

$a_n = a_{n-1} \cdot r$

$f(n) = f(n-1) \cdot r$

5. Use the recursive formula at the right to answer a-c.

a. What is the first term in the sequence?
b. What is the common ratio?
c. List the first four terms in the sequence.

$a_1 = 4$
 $a_n = 3a_{n-1}$

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scaffolded concepts


SEQUENCES



a 5 day TEKS-aligned unit
TEKS: A.12C, A.12D

streamline your planning
process with unit overviews

SEQUENCES OVERVIEW



STANDARD	
READINESS	SUPPORTING
	A.12C identify terms of arithmetic and geometric sequences when the sequences are given in function form using recursive processes A.12D write a formula for the n^{th} term of arithmetic and geometric sequences, given the value of several of their terms

TEACHING IDEAS

- Lists of numbers can represent patterns.
- Recursive formulas can be used.
- Sequences can also be represented by explicit formulas.


ESSENTIAL QUESTION

- How can you determine if a sequence is arithmetic or geometric?
- What type of function relationship does a sequence represent?
- When is it advantageous to use recursive formulas?
- When is it advantageous to use explicit formulas?

✓ key vocabulary
✓ vertical alignment

sample
pacing
calendar

SEQUENCES PACING GUIDE




DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Intro to Arithmetic Sequences	Explicit Formulas of Arithmetic Sequences	Mini-Quiz: Arithmetic Sequences	Intro to Geometric Sequences	Explicit Formulas of Geometric Sequences
Student Handout 1 Homework 1	Student Handout 2 Homework 2			
DAY 6	DAY 7			
Mini-Quiz: Geometric Sequences	Sequences Assessment			
Mini Quiz 2	Assessment			

*This mini-unit was designed to be flexible based on following as examples where individual adjustments

- For teachers and/or districts who include arithmetic included within the other unit.
- For teachers and/or districts who include geometric included within the other unit.
- In each scenario above, specific questions from the unit are included.

SEQUENCES OVERVIEW



TOPIC	TEACHING TIPS
Sequences	<ul style="list-style-type: none">• Many aspects of sequence notation will be new for students, so it may be helpful to build in time to teach students how to "read" the math. For example, "a_n" is read aloud as "a sub n," etc.
Arithmetic Sequences	<ul style="list-style-type: none">• Students can use alliteration to remember that generating terms in an arithmetic sequence involves adding a constant value between consecutive terms (even if the value added is a negative value).• Students can compare arithmetic sequences and their attributes to linear functions and relationships. It may be helpful to note, though, that sequences represent discrete functions while many linear relationships are continuous.
Geometric Sequences	<ul style="list-style-type: none">• Students can compare geometric sequences and their attributes to exponential functions and relationships. It may be helpful to note, though, that sequences represent discrete functions while many exponential relationships are continuous.• If comparing geometric sequences to exponential functions, it may be helpful to point out that the common ratio in a geometric sequence can be negative unlike exponential functions.• As an extension, consider visiting this site (or another similar site) to allow students to visualize the graph of a geometric sequence with a negative common ratio and compare it to the graph of an exponential function. https://demonstrations.wolfram.com/PlotOfAGeometricSequenceAndItsPartialSums/

teaching
ideas

SEQUENCES



a 5 day TEKS-aligned unit
TEKS: A.12C, A.12D

assessments + answer key



quizzes



editable unit test

Unit: Sequences
Mini Quiz 1

Name _____
Date _____ Pd _____

MINI-QUIZ: ARITHMETIC SEQUENCES

Use your knowledge of arithmetic sequences to answer 1-5.

1. Find the next term in each arithmetic sequence. a. -18, -10, -2, 6, ... b. 53, 47, 41, 35, ...	2. The recursive formula of a sequence is shown below. What is the common difference? $a_1 = 1$ $a_n = a_{n-1} + 4$	3. If $a_1 = 22$ and $a_n = a_{n-1} + 4$, write the first five terms of the sequence.
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4. Write an explicit formula to represent the sequence.
8, 17, 26, 35, ...

Unit: Sequences
Mini Quiz 2

Name _____
Date _____ Pd _____

MINI-QUIZ: GEOMETRIC SEQUENCES

Use your knowledge of geometric sequences to answer 1-5.

1. Find the next term in each geometric sequence. a. 256, 128, 64, 32, ... b. -1, -3, -9, -27, ...	2. The recursive formula represents the sequence $\{2, -22, 242, \dots\}$. What is the value of a_4 ? $a_1 = 2$ $a_n = -11a_{n-1}$	3. If $a_1 = 9$ and $a_n = 2a_{n-1}$, write the first five terms of the sequence.
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4. Write an explicit formula to represent the sequence.
6, -12, 24, -48, ...

Unit: Sequences
Mini Quiz 1

Name _____
Date _____ Pd _____

MINI-QUIZ: ARITHMETIC SEQUENCES

Use your knowledge of arithmetic sequences to answer 1-5.

1. Find the next term in each arithmetic sequence. a. -18, -10, -2, 6, ... b. 53, 47, 41, 35, ...	2. The recursive formula of a sequence is shown below. What is the common difference? $a_1 = 1$ $a_n = a_{n-1} + 4$	3. If $a_1 = 22$ and $a_n = a_{n-1} + 4$, write the first five terms of the sequence.
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4. Write an explicit formula to represent the sequence.
8, 17, 26, 35, ...

Unit: Sequences
Mini Quiz 2

Name _____
Date _____ Pd _____

MINI-QUIZ: GEOMETRIC SEQUENCES

Use your knowledge of geometric sequences to answer 1-5.

1. Find the next term in each geometric sequence. a. 256, 128, 64, 32, ... b. -1, -3, -9, -27, ...	2. The recursive formula represents the sequence $\{2, -22, 242, \dots\}$. What is the value of a_4 ? $a_1 = 2$ $a_n = -11a_{n-1}$	3. If $a_1 = 9$ and $a_n = 2a_{n-1}$, write the first five terms of the sequence.
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4. Write an explicit formula to represent the sequence.
6, -12, 24, -48, ...

ALGEBRA 1 CURRICULUM

SEQUENCES

UNIT ELEVEN: ANSWER KEY

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answer keys
included

