Unit 10: Sequences

Name: _____

Goals:

Target A: I can write equations for sequences in both explicit and recursive form.

Target B: I can find terms in both explicit and recursive sequences.

Resources:

http://mrnohner.com/sequences.html

Vocab: Sequences

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V U K A R I T H M E T I C A G Y I N Z B Z V Q K G K O M A H
R Z V N N E J U F X V M D N L S K R C Q J Z E V S I K R R E
L J N T S T A H Z J Y N Q O H B N M A Y G X D Y T Q W O D N
I N X D M R N O H N E R I S S U P E R C O O L A E Y W F V S
H R Y I C R E Z A D G T W I L Z J V P O Y J R I R T S T P J
Q D F Z Q G Z M T V K Z I F H O I J N A F N N F M D B I J H
K C G Q J P D X W P C M V V C O T U I Q O E G I W B H C M Z
E C N E R E F F I D N O M M O C B I O M M T V B H Q O I F L
S X M O O S E D X J O F U D W U F Y M S R I Q I W Y S L B Z
M O H H V M D A A E Q F M T D F C O K Y U U L Y S R P P R O
I R S P R J E S S N P X R Y M A C J Z G J R N L L R T X R F
W O A Y L R M T I I G F F W H R H D D K O G H K F Q U E M G
W M T G W T C W R C D H O N L S O U C V F E C N I O Z C Y Y
D F P H Q S M W Q I T P C G Y W X D R A S I P W N Z M W E P
T J W Z V T C M A G C L Y E M B Q U Z Z Z W R E M E M Y A R
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Explicit Form	Recursive Form	Arithmetic	Geometric Sequence
Common Difference	Common Ratio	Term	Mr. Nohner Is Super Cool

Unit Test Date	

Homework	
Page(s)	Problems

Homework Grading	
Homework completed	Grade
100% AND 50% of challenge problems Or unit project	4
75%	3
50%	2
49% or less	1

Most Valuable Retakes	
Retake	Done?
1.	
2.	
3.	

I can find terms in explicit sequences.
 	
  1) To find terms in the sequence we plug in values to the equation. Start with A_0 by plugging in a 0 for n. Repeat by finding A_1 by plugging in a 1 for n.
	Find four terms **and** label them for this equation in ***explicit form***.
	
	  a. $A_n = 3n - 10$

I can write equations for sequences in explicit form.
 	
  1) Determine if the sequence is arithmetic (grows with addition) or geometric (grows with multiplication).
 	
  2) If it is geometric you write it in the form $A_n = a*b^n$ where the 'b value' is the multiplication value it grows by and 'a value' is the starting value.
 	
  3) If it is arithmetic you write it in the form $A_n = an+b$ where the 'a value' is the addition value it grows by and 'b value' is the starting value.
	Write the ***explicit form equations*** for this sequence.
	
	  a. 6, 11, 16, 21, …
	
	  b. 2, 6, 18, 54, ….

I can find terms in recursive sequences. 1) In recursive form you are given the starting term. 2) To find the next term in the sequence you plug in the previous term for A_{n-1} in the second equation and evaluate. 3) Repeat this process to find as many terms as you need.	Find four terms **and** label them for each of the following equation in ***recursive form***. $A_0 = 3$ $A_n = A_{n-1} - 10$
I can write equations in recursive form. 1) Recursive form equations need two equations. a) The first equation is $A_0 =$ whatever the starting value is. b) The second equation is $A_n = A_{n-1}$ and then whatever operation to get to the next term.	Write the ***recursive equations*** for these sequences. a. 100, 98, 96, … b. 8, 24, 72, …

Today's Target:

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Assignment # 1: Explicit Form Homework

1) What is the difference between an arithmetic sequence and a geometric sequence? Give an example of both.

2) Generate the sequences to a_6 given the following formulas.

    a. $a_n = 4n + 7$

    b. $a_n = 64(\frac{1}{2})^n$

3) Find the explicit form for the following sequences. Start by labeling the sequence.

    a. 100, 95, 90, 85, …

    b. 5, 15, 45 ...

    c. 8, 4, 2, 1, 0.5, …

    d. -1, 3, 7, 11, ...

Assignment #2: Explicit and Recursive Homework

1) Find the recursive form for the following sequences. Start by labeling the sequence.

    a. 4, 2, 0, -2, …

    b. 10, 30, 90, 270,...

    c. 100, 50, 25, 12.5, …

    d. 5, 6, 7, 8, ...

2) Find the explicit form for the following sequences. Start by labeling the sequence.

    a) 4, 2, 0, -2, …

    b) 10, 30, 90, 270,...

    c) 100, 50, 25, 12.5, …

    d) 5, 6, 7, 8, …

3) Carly is thinking of a sequence that starts with 1 and 2. To get the next number in her sequence she always add the previous two together and then add 5. Which form would be easier to write this equation in and what is it?

4) Generate the sequences to a_6 (label them!) given the following formulas.

a. $a_0 = 6$
   $a_n = a_{n-1} + 7$

b. $a_n = -2n + 70$

c. $a_n = 2(3)^n$

d. $a_0 = 1$
   $a_n = 5a_{n-1} + 1$

5) Which form would be better for finding a_{100} of this sequence? Write the equation and find that value given that the first term is a_0.

$$1, 5, 9, 13, ...$$

Assignment #3: Explicit and Recursive Homework *Part 2*

1) Find the **recursive form** for the following sequences. Start by labeling the sequence.

    a. 6, 1, –4, -9, …

    b. 2, 14, 98, 686,...

    c. 1000, 100, 10, 1, …

    d. 5, 15, 25, 35, ...

2) Find the **explicit form** for the following sequences. Start by labeling the sequence.

    a. 6, 1, –4, -9, …

    b. 2, 14, 98, 686,...

    c. 1000, 100, 10, 1, …

    d. 5, 15, 25, 35, ...

Assignment #3: Explicit and Recursive Homework *Part 2*

3) Find A_6 given the following formulas.

a. $a_0 = 2$
   $a_n = a_{n-1} + 1$

b. $a_n = -5n + 70$

c. $a_n = 20(3)^n$

d. $a_0 = 11$
   $a_n = 2a_{n-1} - 5$

4) Write out the following sequence until a_7.

   $a_0 = 1$
   $a_1 = 2$
   $a_2 = 3$
   $a_n = a_{n-1} + a_{n-2} + a_{n-3}$

Assignment #4: Practice Test

1) Name a benefit of recursive form and of explicit form.

2) Describe the difference between arithmetic and geometric sequences.

3) How can you find the multiplier of a sequence that isn't obvious?
   For example: 872, 858.2224, 844.66248608…

4) Find the **<u>recursive form</u>** for the following sequences. Start by labeling the sequence.

   a.   16, 8, 4, 2, …

   b.   11, 13, 15, 17,...

.

5) Find the **<u>explicit form</u>** for the following sequences. Start by labeling the sequence.

   a.   16, 8, 4, 2, …

   b.   11, 13, 15, 17,...

6. Find A_6 given the following formulas.

    a. $a_0 = 5$

        $a_n = a_{n-1} - 2$

    b. $a_n = 5(2)^n$

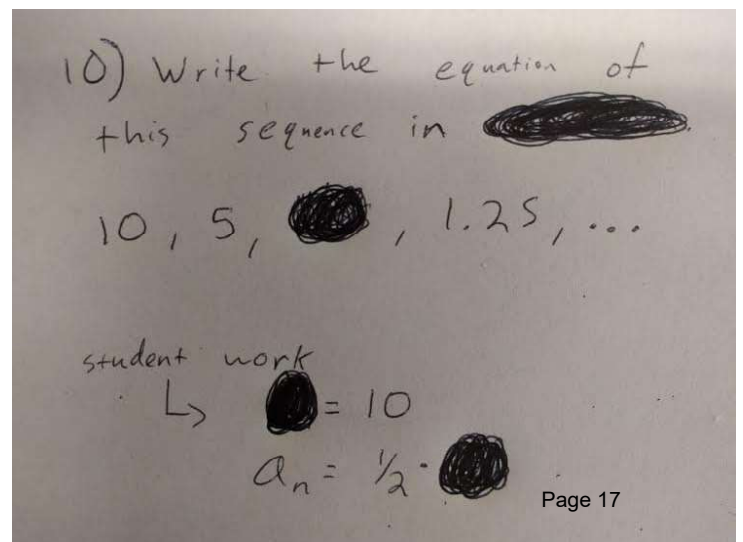7. Write out the following sequence until a_5.

    $a_0 = 1$

    $a_1 = 2$

    $a_n = 2a_{n-1} + 2a_{n-2}$

8. What is the equation of this sequence (hint: use recursive form)

    10, 8, 2, 6, -4, 10, -14, 24, …

9. What is underneath the cross outs of this student's work?

Challenge Problems!!!

1. What is the recursive formula that would create the sequence: 2,3,8,63, 3968,...

2. What is the recursive formula that would create the sequence: 1, 3, 4, 7, 11, 18,....

3. What is the recursive formula that would create the sequence: 10, 9, 1, 8, -7, 15, …

4. Create a sequence where $a_2 = 14$ and $a_{100} = 308$. Write the equation for the sequence in explicit form.

5. Write the next 3 terms of this sequence:
   $a_0 = 1$ $a_1 = 2$ $a_2 = 3$ $a_n = a_{n-1}(a_{n-3} + a_{n-2})$

6. What is the sum of the infinite sequence 1, ½ , ¼ , ⅛ , ...

Unit 10: Sequences Answer Key

Assignment # 1: Explicit Form Homework

1) Arithmetic sequences grow by a constant addition or subtraction, geometric grows by a common multiplier.   2a) 7, 11, 15, 19, 23, 27, 31   2b) 64, 32, 16, 8, 4, 2, 1
3a) $a_n = 100 - 5n$ 3b) $a_n = 5(3)^n$ 3c) $a_n = 8(½)^n$ 3d) $a_n = 4n - 1$

Assignment #2: Explicit and Recursive Homework

1a) $a_0 = 4$ $a_n = a_{n-1} - 2$ 1b) $a_0 = 10$ $a_n = 3a_{n-1}$ 1c) $a_0 = 100$ $a_n = ½a_{n-1}$
1d) $a_0 = 5$ $a_n = a_{n-1} + 1$ 2a) $a_n = 4 - 2n$ 2b) $a_n = 10(3)^n$
2c) $a_n = 100(½)^n$ 2d) $a_n = 5 + n$
3) Recursive Form: $a_0 = 1$ $a_1 = 2$ $a_n = a_{n-1} + a_{n-2} + 5$
4a) 6, 13, 20, 27, 34, 41   4b) 70, 68, 66, 64, 62, 60, 58   4c) 2, 6, 18, 54, 162, 486, 1458
4d) 1, 6, 31, 156, 781, 3906   5) Explicit Form: 401

Assignment #3: Explicit and Recursive Homework Part 2

1a) $a_0 = 6$ $a_n = a_{n-1} - 5$ 1b) $a_0 = 2$ $a_n = 7a_{n-1}$ 1c) $a_0 = 1000$ $a_n = (1/10)a_{n-1}$
1d) $a_0 = 5$ $a_n = a_{n-1} + 10$ 2a) $a_n = 6 - 5n$ 2b) $a_n = 2(7)^n$
2c) $a_n = 1000(½)^n$ 2d) $a_n = 5 + 10n$
3a) 7   3b) 40   3c) 14580
3d) 197
4) 1, 2, 3, 6, 11, 20, 37

Assignment #4: Practice Test

1) Explicit Form allows us to evaluate any term in the sequence without finding all of them.
    Recursive Form allows us to find and write equations that model all different types of growth patterns, not just linear and exponential.
2) Arithmetic sequences grow by a constant addition or subtraction, geometric grows by a common multiplier.
3) Divide the 2nd term by the first. Or the third by the second etc.
4a) $a_0 = 16$ $a_n = (½)a_{n-1}$ 4b) $a_0 = 11$ $a_n = a_{n-1} + 2$ 5a) $a_n = 16(½)^n$
5b) $a_n = 2n + 11$ 6a) -5   6b) 320
7) 1, 2, 6, 16, 44   8) $a_0 = 10$ $a_1 = 8$ $a_n = a_{n-2} - a_{n-1}$
9) Cross out #1: _recursive form_   Cross out #2: _2.5_   Cross out #3: _a_0_
    Cross out #1: _a_{n-1}_

Recursive Food