Algebra RH

Essential Questions: What is a recursive sequence? How do we write their formulas? How do we use recursive formulas to find the terms in a sequence?

<u>Do Now:</u>

Each square in this pattern has side length 1 unit. Imagine that the pattern continues.

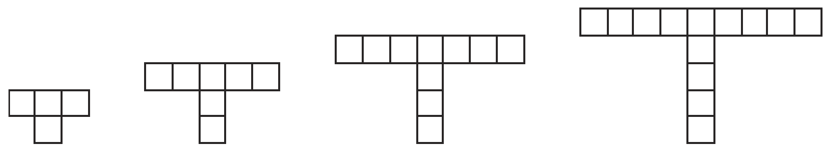
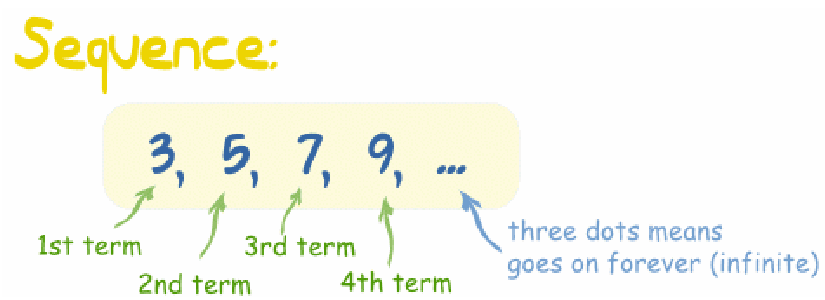


Figure 1 Figure 2 Figure 3 Figure 4

Record the information for the given figures in the table below and then continue the pattern.

Figure	1	2	3	4	5	6
Perimeter						



A **<u>sequence</u>** is a set of numbers called **<u>terms</u>**, in a specific order.

What is a recursive sequence?

A **recursive sequence** is the process in which each step of a pattern is <u>dependent</u> on the step or steps before it.

A famous recursive sequence is the Fibonacci sequence shown below. What is the pattern?

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

Writing a **recursive formula** will help you find the **next term** in a sequence. Each term is found by doing something (+, -, x, ÷) to the **previous term(s)**.

A **recursive formula** is written with **two parts**:

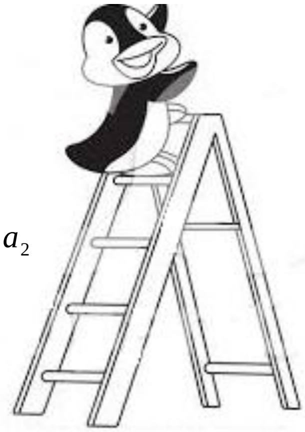
- a statement of the **starting term**, and
- a statement of the **formula** used to arrive at the next term

Given Term	Next Term
a_1	
a_4	
a_{n+1}	
a_n	
$a(6)$	
$a(n)$	
$a(n+1)$	

From the first rung, a_1,

you move to the second rung, a_2

From the second rung, a_2,
you move to the third rung, a_3



Previous Term	Given Term
	a_1
	a_4
	a_{n+1}
	a_n
	$a(6)$
	$a(n)$
	$a(n+1)$

(1) Consider the perimeter example from the Do Now:

(a) Find the pattern.

(b) Write a recursive formula for the sequence.

$a_n = a_{n-1}$ +/-/•/÷ **pattern**

the term in the sequence

the previous term in the sequence

(c) Use the formula to find the 7th term in the sequence.

(2) Consider the sequence: 1, 3, 9, 27 …

(a) Find the pattern.

(b) Write a recursive formula for the sequence.

Write a recursive formula for the following sequences.

(3) 100, 96, 92, ...

(4) 200, 40, 8, ...

Sequences with a combination of operations

Find the first 4 terms in each of the following sequences.

(5) $a_n = a_{n-1} - 4$ where $a_1 = 15$

(6) $a(n+1) = 5a(n)$ and $a(1) = 3$

(7) $a(n) = \frac{1}{4}a(n-1)$ where $a(1) = 8$

(8) $a_{n+1} = 3a_n + 4$ where $a_1 = 5$

(9) The diagrams below represents the first three terms of a sequence.

Assuming the pattern continues, which formula determines the a_n, the number of shaded squares in the n^{th} term?

(a) $a_n = a_{n+1} + 4$

(b) $a_n = a_{n+1} - 4$

(c) $a_n = a_{n-1} + 4$

(d) $a_n = a_{n-1} - 4$