Chapter 9 Sequences & Series

Lesson 9.1 Mathematical Patterns (Clickers)

Essential Understanding: If the numbers in a list follow a pattern, you may be able to relate each number in the list to its numerical position in the list with a rule.

A sequence is an ordered list of numbers. Each number in a sequence is a term of a sequence. You can represent a term of a sequence by using a variable with a subscript number to indicate its position in the sequence. For example, a_5 is the fifth term in the sequence a_q, a_2, a_3, ...

1st term	2nd term	3rd term	...	$n-1$ term	nth term	$n+1$ term	...
↓	↓	↓		↓	↓	↓	
a_1	a_2	a_3	...	a_{n-1}	a_n	a_{n+1}	...

An explicit formula describes the nth term of a sequence using the number n.

For example 2, 4, 6, 8, ...the nth term is twice the value of n. You write $a_n = 2n$.

Ex. A sequence has an explicit formula $a_n = 3n - 2$. What are the first 5 terms of this sequence?

1 A sequence has an explicit formula $a_n = 12n + 3$. What is term a_{12} in this sequence?

Sometimes you can see the pattern in a sequence by comparing each term to the one that came before it. For example, in the sequence 133, 130, 127, 124,... each term after the first term is equal to three less than the previous term.

A recursive definition for this sequence contains 2 parts:

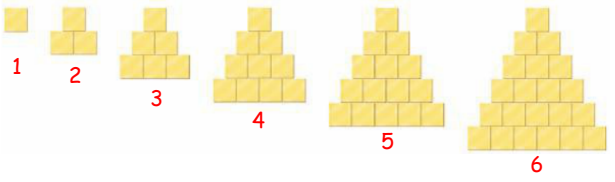
1. an initial condition (the value of the first term):

   $a_1 = 133$

2. a recursive formula (relates each term after the first term to the one before it)

   $a_n = a_{n-1} - 3,\ n > 1$

Ex. The number of blocks in a two-dimensional pyramid is a sequence that follows a recursive formula. What is a recursive definition for the sequence?



Ex. What is a recursive definition for the sequence:

1, 2, 6, 24, 120, 720, ...

2 What is a recursive definition for the sequence

1, 5, 14, 30, 55...?

Recursive formulas work well when you are looking at a small section of a sequence. But when you want the 5000th term an explicit formula works better.

Ex. What is an explicit formula for the sequence

0, 3, 8, 15, 24, ...? What is the 20th term?

Ex. What is an explicit formula for the sequence

1, -1, 1, -1, 1, ...? Find the 300th term.

Ex. What is the 100th term of the pyramid sequence?

If you can figure out the explicit formula within the next 4 minutes, I will give you a jolly rancher