Essential Question: In your own words, describe a recursive sequence. Create your own recursive equation.

Questions:

1. ____________

____________?

2. ____________

____________?

Notes:

Math Notes — Methods and Meanings

Equations for Sequences

Arithmetic Sequences

The (explicit) equation for an arithmetic sequence is: $t(n) = mn + b$ where n is the term number, m is the common difference, and b is the zeroth term (also known as the starting point or initial value). These equations are similar to a continuous linear function $f(x) = mx + b$, where m is the slope (growth) and b is the y-intercept (starting point).

For example, the arithmetic sequence 10, 13, 16, 19, … can be represented by $t(n) = 3n + 7$. (Note that 10 is the first term of this sequence, and 7 is the zeroth term.)

An alternative notation for arithmetic sequences is $a_n = mn + a_0$ where n is the term number, m is the common difference, and a_0 is the zeroth term. Using this alternative notation, the equation for the sequence 10, 13, 16, 19, … is written $a_n = 3n + 7$.

Geometric Sequences

The (explicit) equation for a geometric sequence is: $t(n) = ab^n$, where n is the term number, b is the multiplier or common ratio (sequence generator), and a is the zeroth term. An alternative notation for geometric sequences is $a_n = a_0 \cdot b^n$ where n is the term number, b is the common ratio, and a_0 is the zeroth term.

For example, the geometric sequence 6, 18, 54, … can be represented by $t(n) = 2 \cdot 3^n$ or by $a_n = 2 \cdot 3^n$.

Recursive Sequences

A **recursive sequence** is a sequence in which each term depends on the term(s) before it. The equation of a recursive sequence requires at least one term to be specified. A recursive sequence can be arithmetic, geometric, or neither.
For example, the sequence 3, 11, 123, 15131, … can be defined by the **recursive equation**:

$$t(1) = 3, \quad t(n+1) = (t(n))^2 + 2$$

An alternative notation for the equation of the sequence above is:

$$a_1 = 3, \quad a_{n+1} = (a_n)^2 + 2$$

Answer the essential question:

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