Sequences

Recursive Rules

Warm Up

Find the first 4 terms of the sequence. State whether it is arithmetic, geometric or neither.

1. $t_n = \frac{2}{3}(3)^n$

2. $a_n = \frac{3^n}{n}$

3. $a_1 = 97, \quad a_n = a_{n-1} - 3$

An **EXPLICIT** rule gives a_n as a function of the term's position number *n* in the sequence.

A **RECURSIVE** rule gives the beginning term(s) of a sequence and a *recursive* equation that tells how a_n is related to one or more preceding terms.

Recursive Definition of a Sequence

You must have 2 parts

1. An initial condition that tells where the sequence starts. It can one or more terms.

2. A recursive formula that tells how any term in the sequence is related to the preceding term(s).

Example

Find the first four terms of the sequence.

$$a_1 = 1,\ a_n = 3a_{n-1}$$

Try This

Find the 2nd, 3rd, and 4th terms of the following sequences.

1. $a_1 = 2 \quad a_n = 3a_{n-1}$

2. $t_1 = 1 \quad t_n = t_{n-1} + n$

3. $a_1 = 20 \quad a_n = a_{n-1} - 3$

Example #2

Write the recursive formula for the sequence

3, 13, 23, 33, 43, ….

Try This

Give a recursive formula for the following sequences.

1. 9, 13, 17, 21, ….

2. 24, 12, 6, 3, …..

3. 1, 1, 2, 3, 5, ….

Find the explicit rule for the following sequences.

1. $a_1 = 3 \quad a_n = a_{n-1} + 4$

2. $t_1 = 1 \quad t_n = 2t_{n-1}$

Find a recursive rule for the following sequences.

1. $a_n = -6 + 8n$

2. $t_n = -3\left(\frac{1}{2}\right)^{n-1}$