

Finding Patterns and Working with Sequences

In Activity Set 1.2 you generated some number sequences and looked for patterns that would allow you to predict subsequent terms in the sequence.

Exercise 1. The first sequence you derived from tile patterns was 1, 3, 5, 7, 9, ... the sequence of odd whole numbers.

The 1st term in the sequence is 1.

The 2nd term in the sequence is 3.

The 3rd term in the sequence is 5.

The 4th term in the sequence is 7.

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The 20th term in the sequence is _____.

(1) Each term in the sequence is _____ the preceding term, and the first term is 1.

If we let O_n denote the n^{th} term in the sequence then

$O_1 = \underline{\hspace{1cm}}$; $O_2 = \underline{\hspace{1cm}}$; $O_3 = \underline{\hspace{1cm}}$; $O_4 = \underline{\hspace{1cm}}$; ... ; $O_{20} = \underline{\hspace{1cm}}$.

We can rewrite statement (1) as follows:

(2) $O_n = O_{n-1} + \underline{\hspace{1cm}}$, and
 $O_1 = 1$.

We also found that we could calculate the value of the n^{th} term in the sequence by the following rule. (Write a sentence.)

(3) _____.

We can rewrite statement (3) as follows:

(4) $O_n = \underline{\hspace{2cm}}$.

We can use statement (4) to calculate the 50th term in the sequence as follows:

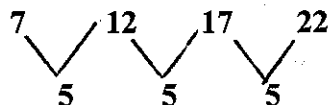
$O_{50} =$

Rules like those in (2) above are called *difference equations*. Rules like those in (4) above are called *functional equations*. We will use both kinds of rules in problem solving.

Exercise 2. In Activity Set 1.2, we also considered the sequence

7, 12, 17, 22, ...

Like with the previous example, it was helpful to examine the difference between successive terms



First Differences

