Instruction

Guided Practice 2.9.1

Example 1

What is the fourth term of the sequence given by the formula $a_n = a_{n-1} + 5$, where a_n is the value of the term, n is the term number, and $a_1 = 2$?

1. Determine whether the sequence is explicit or recursive.

   The formula defines a term in the sequence, a_n, with regard to the term before it, a_{n-1}. Therefore, this is a recursive sequence.

2. Use the given formula to find the first 4 terms of the sequence.

   The first term of the sequence is given: $a_1 = 2$.

   Use this term to find the second term in the sequence.

$a_n = a_{n-1} + 5$	Given formula
$a_2 = a_{2-1} + 5$	Substitute 2 for n.
$a_2 = a_1 + 5$	Simplify the subscript.
$a_2 = (2) + 5$	Substitute 2 for a_1.
$a_2 = 7$	Simplify.

   The second term of the sequence is 7.

   Use this term to find the third term in the sequence.

$a_n = a_{n-1} + 5$	Given formula
$a_3 = a_{3-1} + 5$	Substitute 3 for n.
$a_3 = a_2 + 5$	Simplify the subscript.
$a_3 = (7) + 5$	Substitute 7 for a_2.
$a_3 = 12$	Simplify.

   The third term of the sequence is 12.

   Use this term to find the fourth term in the sequence.

$a_n = a_{n-1} + 5$	Given formula
$a_4 = a_{4-1} + 5$	Substitute 4 for n.
$a_4 = a_3 + 5$	Simplify the subscript.
$a_4 = (12) + 5$	Substitute 12 for a_3.
$a_4 = 17$	Simplify.

   The fourth term of the sequence is 17.

SWB p. 213

Instruction

Example 2

Identify the missing terms in the sequence using recursion.

$A = \{8, 13, 18, 23, a_5, a_6, a_7\}$

1. Determine the pattern by looking for a common difference. Use this information to write a formula to find a_n.

   Subtract the first term from the second term and then continue that pattern to see if the difference between each pair of terms is the same.

   $a_2 - a_1 = 13 - 8 = 5$

   $a_3 - a_2 = 18 - 13 = 5$

   $a_4 - a_3 = 23 - 18 = 5$

   The terms are separated by a common difference of 5. This means that to find each term (a_n), add 5 to the term before it (a_{n-1}).

   From this, we can deduce that $a_n = a_{n-1} + 5$.

2. Use the formula to find the missing terms.

   Find each missing term, a_n, by substituting the term immediately before it for a_{n-1} and solving for a_n.

   The missing terms are a_5, a_6, and a_7.

   $a_n = a_{n-1} + 5$

   $a_5 = a_4 + 5 = 23 + 5 = 28$

   $a_6 = a_5 + 5 = 28 + 5 = 33$

   $a_7 = a_6 + 5 = 33 + 5 = 38$

   The missing terms are 28, 33, and 38.

Instruction

Example 3

Find the ninth term in the sequence given by the formula $a_n = 3n + 1$, where a_n is the value of the term and n is the term number. Then, find and graph the first 5 terms in the sequence.

1. Determine whether this is an explicit formula or a recursive formula, then use the formula to find the desired term.

   The formula is explicit because plugging in the given term number (9 in this case) will produce the desired term. Substitute 9 for n and solve.

   $a_n = 3n + 1$ Given formula

   $a_9 = 3(9) + 1$ Substitute 9 for n.

   $a_9 = 27 + 1$ Multiply.

   $a_9 = 28$ Add.

   The ninth term in the sequence is 28.

2. Find the first 5 terms of the sequence.

   Substitute 1, 2, 3, 4, and 5, respectively, for n, then solve for the term.

   $a_n = 3n + 1$

   $a_1 = 3(1) + 1 = 4$

   $a_2 = 3(2) + 1 = 7$

   $a_3 = 3(3) + 1 = 10$

   $a_4 = 3(4) + 1 = 13$

   $a_5 = 3(5) + 1 = 16$

   The first 5 terms are 4, 7, 10, 13, and 16.

Instruction

3. Create ordered pairs from the sequence.

   n is the first coordinate, and a_n is the second coordinate.

   (n, a_n)

   (1, 4)

   (2, 7)

   (3, 10)

   (4, 13)

   (5, 16)

4. Plot the ordered pairs.