Instruction

Guided Practice 3.8.1

Example 1

Find the common difference, write the explicit formula, and find the tenth term for the following arithmetic sequence.

3, 9, 15, 21, ...

1. Find the common difference by subtracting two successive terms.

   $9 - 3 = 6$

2. Confirm that the difference is the same between all of the terms.

   $15 - 9 = 6$ and $21 - 15 = 6$

3. Identify the first term (a_1).

   $a_1 = 3$

4. Write the explicit formula.

   $a_n = a_1 + (n - 1)d$ Explicit formula for any given arithmetic sequence

   $a_n = 3 + (n - 1)6$ Substitute values for a_1 and d.

5. Simplify the explicit formula.

   $a_n = 3 + 6n - 6$ Distribute 6 over $(n - 1)$.

   $a_n = 6n - 3$ Combine like terms.

6. To find the tenth term, substitute 10 for n.

   $a_{10} = 6(10) - 3$

   $a_{10} = 60 - 3$

   $a_{10} = 57$

   The tenth term in the sequence is 57.

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Example 2

Write a linear function that corresponds to the following arithmetic sequence.

8, 1, –6, –13, ...

1. Find the common difference by subtracting two successive terms.

   $1 - 8 = -7$

2. Confirm that the difference is the same between all of the terms.

   $-6 - 1 = -7$ and $-13 - (-6) = -7$

3. Identify the first term (a_1).

   $a_1 = 8$

4. Write the explicit formula.

$a_n = a_1 + (n - 1)d$	Explicit formula for any given arithmetic sequence
$a_n = 8 + (n - 1)(-7)$	Substitute values for a_1 and d.

5. Simplify the explicit formula.

$a_n = 8 - 7n + 7$	Distribute –7 over $(n - 1)$.
$a_n = -7n + 15$	Combine like terms.

6. Write the formula in function notation.

   $f(x) = -7x + 15$

   Note that the domain of an arithmetic sequence is positive consecutive integers.

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Example 3

An arithmetic sequence is defined recursively by $a_n = a_{n-1} + 5$, with $a_1 = 29$. Find the first 5 terms of the sequence, write an explicit formula to represent the sequence, and find the 15th term.

1. Using the recursive formula:

   $a_1 = 29$

   $a_2 = a_1 + 5$

   $a_2 = 29 + 5 = 34$

   $a_3 = 34 + 5 = 39$

   $a_4 = 39 + 5 = 44$

   $a_5 = 44 + 5 = 49$

   The first five terms of the sequence are 29, 34, 39, 44, and 49.

2. The first term is $a_1 = 29$ and the common difference is $d = 5$, so the explicit formula is $a_n = 29 + (n - 1)5$.

3. Simplify.

   $a_n = 29 + 5n - 5$

   $a_n = 5n + 24$ Combine like terms.

4. Substitute 15 in for n to find the 15th term in the sequence.

   $a_{15} = 5(15) + 24$

   $a_{15} = 75 + 24$

   $a_{15} = 99$

   The 15th term in the sequence is 99.