LESSON MAKER PRO

Index Detective

Find which term numbers belong in each sequence.

HIGH SCHOOL · MA.912.AR.10.6

MA.912.AR.10.6 "Given a mathematical or real-world context, find the domain of a given sequence defined recursively or explicitly."

NAME _____ DATE _____

THE BIG IDEA

The domain of a sequence is the set of index values n that can name its terms. Use whole-number indices, start at the stated first index, and exclude any index that makes a formula undefined or does not fit the context.

WORKED EXAMPLE

Find the domain of the sequence $a_n = 17n - 13$.

1. Sequence indices are positive integers unless a different starting index is given.
2. The expression 17n - 13 is defined for every positive integer n.
3. Write the domain using the index n.

Answer: n ∈ positive integers

PRACTICE 6 problems

1 1. Find the domain of $a_n = \sqrt{(n - 4)}$.

ANSWER _____

2 2. Find the domain of $b_n = 8/(n - 6)$.

ANSWER _____

3 3. Find the domain of the recursive sequence $c_1 = 7$ and $c_n = c_{n-1} + 3$ for $n \geq 2$.

ANSWER _____

4 4. Find the domain of the recursive sequence $d_0 = 12$ and $d_n = d_{n-1} - 2$ for $n \geq 1$.

ANSWER _____

5 5. Find the domain of $e_n = \sqrt{(10 - n)}$.

ANSWER _____

6 6. Find the domain of $f_n = 5/(2n + 1)$.

ANSWER _____

APPLY IT Show your work

1 1. During a 14-week esports league, a player's ranked points after week n are modeled by $p_n = 40n + 120$. The league records one total after each week. Find the domain of n.

WORK SPACE

ANSWER _____

2 2. A student buys a 64-GB tablet and tracks free storage at the end of each month. Let $s_0 = 64$, and $s_n = s_{n-1} - 4$ for n = 1, 2, ..., 9. Find the domain of n.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A sequence is defined by $g_1 = 22$ and $g_n = g_{n-1} - 4$ for $n \geq 2$. Only terms with nonnegative values are included. Find the domain and explain why the next index is not included.

WORK SPACE AND ANSWER

ANSWER KEY # Index Detective

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	1. Find the domain of $a_n = \sqrt{(n - 4)}$.	**$n \in \{4, 5, 6, \ldots\}$**
2	2. Find the domain of $b_n = 8/(n - 6)$.	**$n \in$ positive integers, $n \neq 6$**
3	3. Find the domain of the recursive sequence $c_1 = 7$ and $c_n = c_{n-1} + 3$ for $n \geq 2$.	**$n \in$ positive integers**
4	4. Find the domain of the recursive sequence $d_0 = 12$ and $d_n = d_{n-1} - 2$ for $n \geq 1$.	**$n \in$ nonnegative integers**
5	5. Find the domain of $e_n = \sqrt{(10 - n)}$.	**$n \in \{1, 2, 3, \ldots, 10\}$**
6	6. Find the domain of $f_n = 5/(2n + 1)$.	**$n \in$ positive integers**

PART 2 · APPLY IT

1. **$n \in \{1, 2, 3, \ldots, 14\}$** Week numbering begins with week 1 and ends with week 14. The formula is defined at every one of those integer indices.
2. **$n \in \{0, 1, 2, \ldots, 9\}$** The starting storage amount is indexed by 0. The recursive rule then gives one term for each month through index 9.

CHALLENGE

$n \in \{1, 2, 3, 4, 5, 6\}$. The sixth term is 2, but the seventh term is -2, so index 7 is not included.

Accept equivalent set notation or set-builder notation for each discrete domain. Do not accept continuous intervals because sequence indices are whole numbers.