

Index Into Sequences

See how integer inputs make a sequence a function.

HIGH SCHOOL • AII-F.IF.3

AII-F.IF.3 "Recognize that a sequence is a function whose domain is a subset of the integers."

NAME _____

DATE _____

SEQUENCES AS FUNCTIONS

A sequence is a function because each allowed index gives exactly one output. Its domain is a subset of the integers, such as positive integers, nonnegative integers, or a listed set of integers.

WORKED EXAMPLE

For $a_n = 17n - 14$, find a_9 .

1. Substitute 9 for n : $a_9 = 17(9) - 14$.
2. Multiply: $a_9 = 153 - 14$.
3. Subtract: $a_9 = 139$.

Answer: 139

PRACTICE 6 problems

- 1** For $p_n = 5n - 3$, where n is a positive integer, find p_6 .

ANSWER _____

- 2** A relation gives $q_{-3} = 8$, $q_0 = 1$, and $q_3 = -6$. Is q a function? Write its domain and range.

ANSWER _____

- 3** The rule $r_n = n + 10$ is used only when n is -6 , -3 , 0 , or 3 . Write the domain of r .

ANSWER _____

- 4** For $t_n = 6n + 5$ with domain $\{0, 1, 3\}$, write the input-output ordered pairs.

ANSWER _____

- 5** A relation gives $u_1 = 12$, $u_3 = 15$, and $u_1 = 18$. Is u a sequence? Explain.

ANSWER _____

- 6** For $v_n = n^2 + 1$ with domain $\{-5, -1, 0, 3\}$, find v_{-5} .

ANSWER _____

APPLY IT Show your work

- 1** A student earns $g_n = 12 + 3n$ points in a music app during week n , where n is in $\{0, 1, 2, 3, 4, 5, 6\}$. State the domain and find g_6 . Then explain why g is a function.

WORK SPACE

ANSWER _____

- 2** A student tracks songs saved to a workout playlist after every other practice session. Use the table to decide whether the data define a sequence. State the domain and find s_4 .

WORKOUT PLAYLIST

Session n	Songs saved, s_n
0	11
2	16
4	21
6	26

ANSWER _____

CHALLENGE One step up

A relation h has domain all integers. It follows $h_n = n + 1$ when n is even and $h_n = 2n$ when n is odd. Is h a sequence? Explain, then find h_{-3} and h_4 .

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	For $p_n = 5n - 3$, where n is a positive integer, find p_6 .	27
2	A relation gives $q_3 = 8$, $q_0 = 1$, and $q_3 = -6$. Is q a function? Write its domain and range.	Yes. Domain: $\{-3, 0, 3\}$; range: $\{8, 1, -6\}$.
3	The rule $r_n = n + 10$ is used only when n is -6 , -3 , 0 , or 3 . Write the domain of r .	$\{-6, -3, 0, 3\}$
4	For $t_n = 6n + 5$ with domain $\{0, 1, 3\}$, write the input-output ordered pairs.	$(0, 5), (1, 11), (3, 23)$
5	A relation gives $u_1 = 12$, $u_3 = 15$, and $u_1 = 18$. Is u a sequence? Explain.	No. The input 1 has two different outputs, 12 and 18.
6	For $v_n = n^2 + 1$ with domain $\{-5, -1, 0, 3\}$, find v_{-5} .	26

PART 2 • APPLY IT

- Domain: $\{0, 1, 2, 3, 4, 5, 6\}$; $g_6 = 30$. It is a function because each allowed week number has exactly one points total.**
Use the listed week numbers as the domain. Substitute 6 into $12 + 3n$ to get 30, and note that the rule gives one output for each input.
- Yes. Domain: $\{0, 2, 4, 6\}$; $s_4 = 21$.** The session numbers are integers, and each listed session has exactly one songs-saved value. Read the row with input 4 to get 21.

CHALLENGE

Yes. All integers are a subset of the integers, and each integer is either even or odd, so each input has exactly one output. $h_{-3} = -6$ and $h_4 = 5$.

Accept domains and ranges written in set notation or described in words. For explanations, accept any statement that correctly says each allowed integer input has exactly one output.