

Domain Detectives

Use graphs, rules, and situations to choose allowed inputs.

HIGH SCHOOL • HSF-IF.B.5

CCSS.Math.Content.HSF-IF.B.5 "Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory..."

NAME _____

DATE _____

FIND THE ALLOWED INPUTS

The domain is the set of input values a function can use. Read x-values from a graph, input values from a table or mapping, and realistic limits from a situation.

WORKED EXAMPLE

A graph begins at the filled point $(-8, 11)$ and continues to the right with an arrow. What is the domain?

1. The graph starts at $x = -8$.
2. The filled point means -8 is included.
3. The arrow to the right means all greater x-values are included.

Answer: $x \geq -8$

PRACTICE 6 problems

- 1** A nonvertical line has arrows on both ends. What is its domain?

ANSWER _____

- 2** A graph begins at an open point with x-coordinate -6 and ends at a filled point with x-coordinate 5 . The graph includes every x-value between them. What is the domain?

ANSWER _____

- 3** A mapping has input values $-4, 1, 7$, and 9 . What is the domain?

ANSWER _____

- 4** What is the domain of $f(x) = \sqrt{x + 3}$?

ANSWER _____

- 5** What is the domain of $g(x) = 2/(x - 4)$?

ANSWER _____

- 6** $V(t)$ gives the number of viewers watching a livestream t hours after it begins. The stream lasts 12 hours. What domain makes sense for t ?

ANSWER _____

APPLY IT Show your work

- 1** The drama club sells tickets for a student concert. $R(n) = 4n$ gives the money raised when n tickets are sold. The venue holds at most 250 people. What domain makes sense for n ?

WORK SPACE

ANSWER _____

- 2** During a 45-minute workout, $B(t)$ gives the amount of water left in a bottle t minutes after the workout starts. What domain makes sense for t ?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

The formula $h(x) = \sqrt{49 - x^2}$ models the height of an arch. Here, x is the horizontal distance in meters from the center of the arch to a point on its right half. What domain makes sense for x ? Explain why.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A nonvertical line has arrows on both ends. What is its domain?	all real numbers
2	A graph begins at an open point with x-coordinate -6 and ends at a filled point with x-coordinate 5. The graph includes every x-value between them. What is the domain?	$-6 < x \leq 5$
3	A mapping has input values -4, 1, 7, and 9. What is the domain?	$\{-4, 1, 7, 9\}$
4	What is the domain of $f(x) = \sqrt{x + 3}$?	$x \geq -3$
5	What is the domain of $g(x) = 2/(x - 4)$?	all real numbers except 4
6	$V(t)$ gives the number of viewers watching a livestream t hours after it begins. The stream lasts 12 hours. What domain makes sense for t ?	$0 \leq t \leq 12$

PART 2 • APPLY IT

- n can be any whole number from 0 through 250.** n counts tickets, so it must be a whole number. The club cannot sell fewer than 0 or more than 250 tickets.
- $0 \leq t \leq 45$** Time begins at 0 minutes and ends at 45 minutes. Time can include fractional minutes, so all real values in the interval make sense.

CHALLENGE

$0 \leq x \leq 7$. The square root requires $49 - x^2$ to be at least 0, and the right-half distance cannot be negative.

Accept interval notation for continuous domains, such as $[0, 12]$ or $(-6, 5]$. For the ticket situation, accept set-builder notation showing whole-number values from 0 through 250.