

Domain Detectives

Find the inputs a function can use.

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 _____

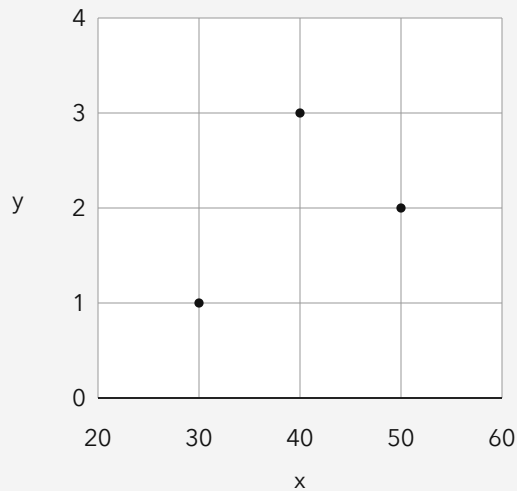
DATE _____

TRACK THE INPUTS

The domain is the set of allowed inputs. On a graph, read the x-values of actual points, not the limits of the axes. A filled endpoint is included; an open endpoint is excluded. In context, distinguish continuous measurements such as elapsed time from counts such as completed quests. Formula restrictions also matter: no division by zero and no negative real square-root input.

WORKED EXAMPLE

This function consists of only the three plotted points. Find its domain. Why do the other visible x-values not belong?



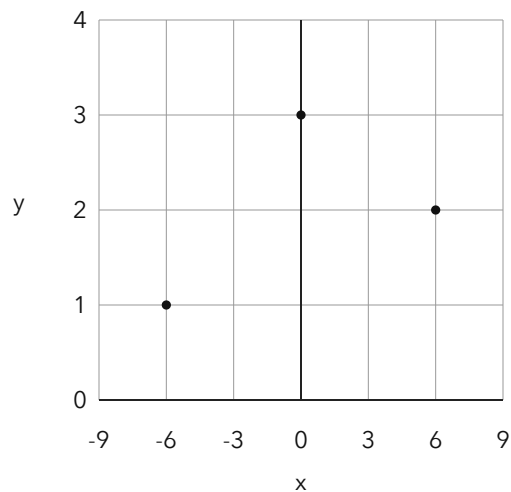
1. Read the x-coordinate of each plotted point.
2. The points have x-values 30, 40 and 50.
3. The grid is a viewing window; it does not fill the gaps with function points.

Answer: {30, 40, 50}; no other input has a plotted output.

PRACTICE 6 problems

- 1** This function consists only of the three plotted points. Write its domain.

ANSWER _____



- 2** What is the domain of $f(x) = x^2 - 14$?

ANSWER _____

- 3** For real-valued $g(x) = \sqrt{x - 13}$, find the domain and state the restriction.

ANSWER _____

- 4** Function $q(n)$ gives points earned after n completed rounds of a game. No maximum number of rounds is imposed, and zero completed rounds is allowed. What domain is appropriate?

ANSWER _____

- 5** Function $m(t)$ models paint mixed during a mural project, from its start until its end 25 hours later. Here t is elapsed hours, including fractional hours. What domain is appropriate?

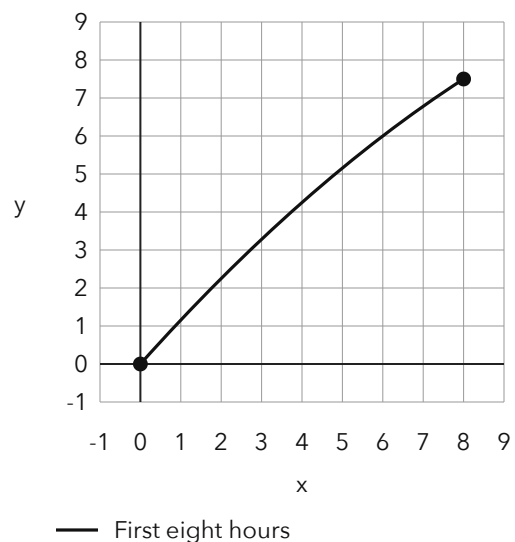
ANSWER _____

- 6** Find the real domain of $p(x) = 4/(x - 27)$. Explain the excluded input.

ANSWER _____

APPLY IT Show your work

- 1** This smoothed model uses x for elapsed hours and y for hundreds of video views. It describes only the first eight hours, including both endpoints. State its domain and explain why the inputs form a continuous interval.

REASONING AND ANSWER

- 2** A club has 23 quests in a tournament, each of which a player can complete at most once. Function $e(n)$ gives points earned after n completed quests, including zero. What is the domain?

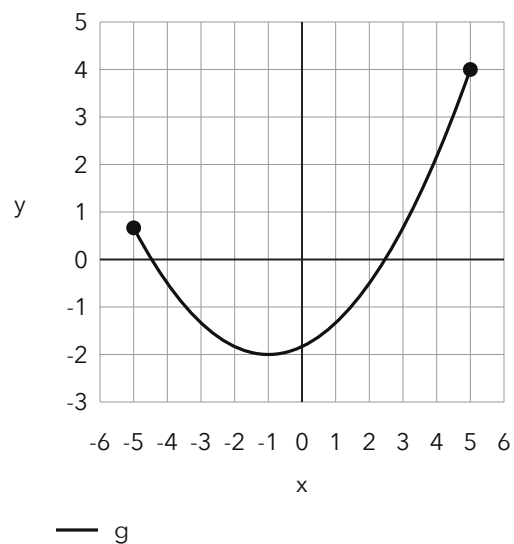
WORK SPACE

REASONING AND ANSWER

CHALLENGE One step up

Mia says the domain of g is $[-3, 5]$ because she read the lowest and highest numbers on the vertical axis. Is she correct? Give the domain and explain what the filled endpoints tell you.

WORK SPACE AND ANSWER



PRACTICE 1 **$\{-6, 0, 6\}$** **PRACTICE 2****All real numbers****PRACTICE 3** **$[13, \text{infinity})$, because $x - 13$ must be nonnegative.****PRACTICE 4****Nonnegative integers****PRACTICE 5** **$[0, 25]$** **PRACTICE 6****All real numbers except 27; at $x = 27$ the denominator is zero.****APPLY IT 1**

$[0, 8]$, all real elapsed times from 0 through 8 hours. Filled endpoints include 0 and 8. Elapsed time can take fractional values; a continuous domain does not require a continuously changing real-world count.

APPLY IT 2

$\{0, 1, 2, \dots, 23\}$ The input n counts completed quests. A player can complete zero through 23 quests, but cannot complete a fraction of a quest.

CHALLENGE

No. The domain is $[-5, 5]$. Read the horizontal extent of the actual curve; its filled endpoints include $x = -5$ and $x = 5$. Vertical-axis bounds are not domain values.

Accept intervals or equivalent inequalities for continuous domains. Counts require discrete integers.

Domain comes from actual plotted points and stated context, not the graph window or output values. All finite endpoints in these supplied continuous models are filled and included.