

Domain Detectives

Use graphs and situations to find allowed x -values.

GRADE 8 • 8.FGR.5.3

8.FGR.5.3 "Relate the domain of a linear function to its graph and where applicable to the quantitative relationship it describes."

NAME _____

DATE _____

FIND THE DOMAIN

The domain is the set of x -values a function can use. A line with arrows on both ends has all real numbers as its domain, but endpoints, open circles, and real-world limits can restrict the domain. In a situation, decide whether x can be any value in an interval or only certain values, such as whole-number counts.

WORKED EXAMPLE

The graph of $y = 7x + 11$ is a line with arrows on both ends. What is its domain?

1. The arrows show that the line continues left and right.
2. Every x -value is included.

Answer: All real numbers.

PRACTICE 6 problems

- 1** A graph is a straight line with arrows on both ends. State its domain.

ANSWER _____

- 2** A graph is a line segment from $(-6, 4)$ to $(5, -1)$. Both endpoints are solid. State the domain.

ANSWER _____

- 3** A graph is a ray that starts at the solid point $(1, -3)$ and extends left forever. State the domain.

ANSWER _____

- 4** The function $y = 4x + 9$ gives the cost, in dollars, of buying x notebooks. What domain makes sense for x ?

ANSWER _____

- 5** A hiker has 16 miles to travel. The function $y = 16 - x$ gives the miles remaining after x miles walked. What domain makes sense for x ?

ANSWER _____

- 6** A graph has an open circle at $(-2, 3)$ and a ray that extends right forever. State the domain.

ANSWER _____

APPLY IT Show your work

- 1** A gaming cafe charges $C = 5h + 3$ dollars for a reservation of h hours. You may reserve 0 through 4 whole hours. What is the domain of h ? Would the graph show a connected line or separate points?

WORK SPACE

ANSWER _____

- 2** A phone battery starts at 96% and drops 8% each hour while streaming. The function $B = 96 - 8t$ gives the battery percent after t hours. The phone is used until the battery reaches 0%. What is the domain of t ? Would the graph be continuous or discrete?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

The equation $y = -3x + 18$ is graphed only for x -values greater than -2 and up to 8 , inclusive. A student says the domain is all real numbers because the equation is linear. Is the student correct? State the domain and explain.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A graph is a straight line with arrows on both ends. State its domain.	All real numbers.
2	A graph is a line segment from $(-6, 4)$ to $(5, -1)$. Both endpoints are solid. State the domain.	$-6 \leq x \leq 5$
3	A graph is a ray that starts at the solid point $(1, -3)$ and extends left forever. State the domain.	$x \leq 1$
4	The function $y = 4x + 9$ gives the cost, in dollars, of buying x notebooks. What domain makes sense for x ?	$x = 0, 1, 2, 3, \dots$
5	A hiker has 16 miles to travel. The function $y = 16 - x$ gives the miles remaining after x miles walked. What domain makes sense for x ?	$0 \leq x \leq 16$
6	A graph has an open circle at $(-2, 3)$ and a ray that extends right forever. State the domain.	$x > -2$

PART 2 • APPLY IT

- $h = 0, 1, 2, 3, 4$; separate points.** Hours are limited to whole-number reservations from 0 to 4. Plot one point for each allowed value of h , so the graph is discrete.
- $0 \leq t \leq 12$; continuous.** Set the battery percent to 0: $96 - 8t = 0$, so $t = 12$. Time can include fractional hours, so all values from 0 through 12 are allowed.

CHALLENGE

No. The domain is $-2 < x \leq 8$ because the displayed graph is restricted to those x -values, even though the equation could continue forever.

Accept equivalent interval notation, such as $[-6, 5]$ and $(-2, \text{infinity})$. For real-world situations, accept clear statements that distinguish continuous intervals from discrete whole-number values.