LESSON MAKER PRO

Where Functions Work

Find domains from graphs, rules, and real situations.

HIGH SCHOOL · A2S.AF.H.18

A2S.AF.H.18 "Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. Extend to polynomial, trigonometric (sine and cosine), logarithmic, reciprocal, radical, and general piecewise functions."

NAME _____ DATE _____

THE BIG IDEA

The domain is the set of inputs a function can use. On a graph, look for the x-values where the graph exists. Check the rule, too: a square root cannot contain a negative number, a denominator cannot be zero, and a logarithm needs a positive input.

WORKED EXAMPLE

Use the graph and y = sqrt(x + 17) to find the domain.

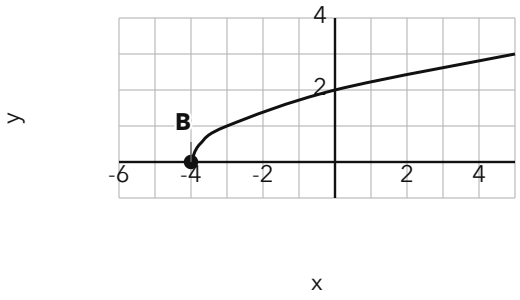


1. The graph starts at the filled point A, where x = -17.
2. The rule requires x + 17 >= 0, so x >= -17.
3. The curve reaches the right edge of the grid, and the rule allows every larger x-value.

Answer: The domain is x >= -17.

PRACTICE 6 problems

1 Use the graph and y = sqrt(x + 4) to find the domain.



ANSWER _____

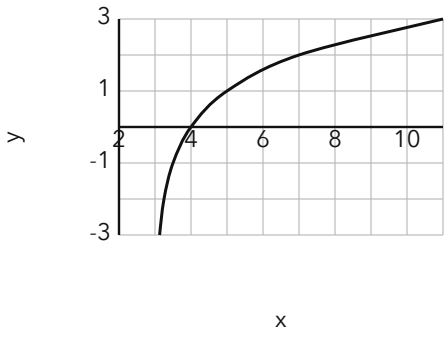
2 Find the domain of $y = 5/(x - 2)$.

ANSWER _____

3 Find the domain of $y = x^2 - 6x + 1$.

ANSWER _____

4 Use the graph and $y = \log_2(x - 3)$ to find the domain.



ANSWER _____

5 Find the domain of $y = 3\cos(x)$.

ANSWER _____

6 A function follows two rules: f(x) = x + 1 when x < -2, and f(x) = sqrt(x - 1) when x >= 1. Find its domain. Explain why there is a gap.

ANSWER _____

APPLY IT Show your work

1 A phone plan includes up to 8 GB of data each month. If you use x GB, your bill is C(x) = 6 + 2x dollars. You can use any fraction of a GB. What is the domain of C in this situation?

WORK SPACE

ANSWER _____

2 You and your friends split a $48 game pass equally. If x people share it, each person pays C(x) = 48/x dollars. The pass allows at most 8 people. What is the domain of C in this situation?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A function follows two rules: f(x) = sqrt(x + 5)/(x - 1) when x < 3, and f(x) = $\log_2(x - 3)$ when x >= 3. Find the domain and explain why x = 1 and x = 3 are excluded.

WORK SPACE AND ANSWER

ANSWER KEY

Where Functions Work

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the graph and y = sqrt(x + 4) to find the domain.	**x >= -4**
2	Find the domain of y = 5/(x - 2).	**All real numbers except x = 2.**
3	Find the domain of $y = x^2 - 6x + 1$.	**All real numbers.**
4	Use the graph and $y = \log_2(x - 3)$ to find the domain.	**x > 3**
5	Find the domain of y = 3 cos(x).	**All real numbers.**
6	A function follows two rules: f(x) = x + 1 when x < -2, and f(x) = sqrt(x - 1) when x >= 1. Find its domain. Explain why there is a gap.	**x < -2 or x >= 1. No rule assigns an output when -2 <= x < 1.**

PART 2 · APPLY IT

1. **0 <= x <= 8** Data use cannot be negative or exceed the plan's 8 GB limit. Fractions of a GB are allowed, so every value from 0 through 8 is in the domain.
2. **x = 1, 2, 3, 4, 5, 6, 7, or 8** The number of people must be a whole number from 1 through 8. Zero people cannot split the cost, and the pass does not allow more than 8.

CHALLENGE

The domain is [-5, 1) union (1, 3) union (3, infinity). At x = 1, the denominator is zero. At x = 3, the logarithm's input is zero.

Accept equivalent interval or inequality notation. For the game pass, accept any notation that lists only the whole numbers 1 through 8.