LESSON MAKER PRO

Branch by Branch

Graph and analyze piecewise functions

HIGH SCHOOL · A2.F.1.8

A2.F.1.8 "Graph piecewise functions with no more than three branches (linear, quadratic, or exponential). Analyze the function by identifying the domain, range, intercepts, and intervals for which it is increasing, decreasing..."

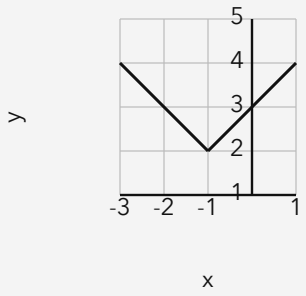
NAME _____ DATE _____

READ EACH BRANCH

Graph each rule only on its stated x-values. To find the range, combine the y-values from all branches. Read from left to right to find where the graph rises, falls, or stays level.

WORKED EXAMPLE

The figure shows the full graph for -3 <= x <= 1. Find its range and where it is decreasing.



1. Read the lowest and highest y-values: 2 and 4.
2. Read left to right. The graph falls from x = -3 to x = -1.

Answer: Range: [2, 4]. Decreasing: -3 < x < -1.

PRACTICE 4 problems

1 Sketch y = x + 1 for 0 <= x <= 2, then y = 3 for 2 < x <= 4. Give the range and where the function is constant.

ANSWER _____

2 Sketch $y = x^2$ for -1 <= x <= 1, then y = 1 for 1 < x <= 3. Give the range and both intercepts.

ANSWER _____

3 Sketch $y = 2^x$ for 0 <= x <= 2, then y = 4 for 2 < x <= 3. Give the y-intercept and where the function is increasing.

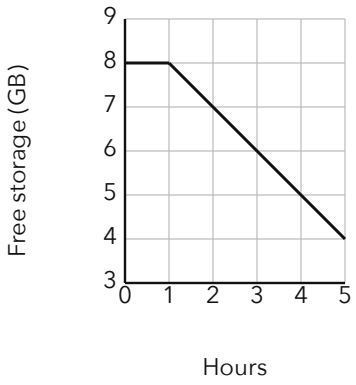
ANSWER _____

4 Sketch y = x + 2 for -1 <= x < 1, then y = 5 for 1 <= x <= 3. Give the domain and range.

ANSWER _____

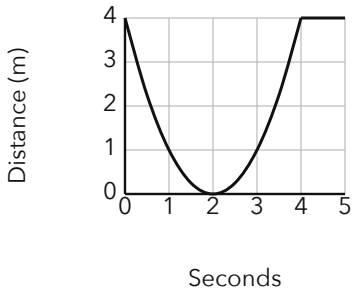
APPLY IT Show your work

1 The graph shows free storage on a phone. When is the storage constant, and what is its range?



ANSWER _____

2 The graph shows a skateboarder's distance from the center of a ramp. When is the distance decreasing, and when is it constant?



ANSWER _____

CHALLENGE One step up

Graph this three-branch function. Give its range and all x-intercepts: $y = x + 2$ for $-2 <= x < 0$; $y = (x - 1)^2$ for $0 <= x <= 2$; $y = 2^{x - 2}$ for $2 < x <= 3$.

WORK SPACE AND ANSWER

Branch by Branch

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Sketch y = x + 1 for 0 <= x <= 2, then y = 3 for 2 < x <= 4. Give the range and where the function is constant.	**Range: [1, 3]. Constant: 2 < x < 4.**
2	Sketch $y = x^2$ for -1 <= x <= 1, then y = 1 for 1 < x <= 3. Give the range and both intercepts.	**Range: [0, 1]. Both the x-intercept and y-intercept are (0, 0).**
3	Sketch $y = 2^x$ for 0 <= x <= 2, then y = 4 for 2 < x <= 3. Give the y-intercept and where the function is increasing.	**Y-intercept: (0, 1). Increasing: 0 < x < 2.**
4	Sketch y = x + 2 for -1 <= x < 1, then y = 5 for 1 <= x <= 3. Give the domain and range.	**Domain: [-1, 3]. Range: [1, 3) and {5}.**

PART 2 · APPLY IT

1. **Constant: 0 < x < 1 hours. Range: [4, 8] GB.** The graph is level from hour 0 to hour 1. Its lowest and highest storage values are 4 GB and 8 GB.
2. **Decreasing: 0 < x < 2 seconds. Constant: 4 < x < 5 seconds.** The distance falls until second 2. The graph is level from second 4 to second 5.

CHALLENGE

Range: [0, 2]. X-intercepts: (-2, 0) and (1, 0).

Accept intervals with included endpoints when they describe the same increasing, decreasing, or constant stretch. In problem 4, accept [1, 3) union {5} for the range.