LESSON MAKER PRO

Function Shape Detectives

Classify real functions and sketch their graphs.

GRADE 8 · 8.FGR.5.2

8.FGR.5.2 "Within realistic situations, identify and describe examples of functions that are linear or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally."

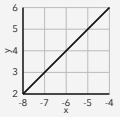
NAME _____ DATE _____

SPOT THE PATTERN

A linear function has a constant rate of change, so its graph is a straight line. A nonlinear function has a changing rate of change, so its graph is curved or changes shape. To sketch, plot a starting value and follow the described change.

WORKED EXAMPLE

Use the graph. Is the function linear? Find its rate of change.



1. Choose two points, (-8, 2) and (-7, 3).
2. Find the changes: y rises 1 and x rises 1.
3. Compute the rate: 1/1 = 1.
4. The graph is straight, so it is linear.

Answer: Linear; rate of change = 1.

PRACTICE 4 problems

1 For x = 0, 2, 4, 6, the y-values are 9, 13, 17, 21. Is the function linear or nonlinear? State the rate of change.

ANSWER _____

2 A plant is 11 cm tall and grows 4 cm each week. Is its height versus time linear or nonlinear?

ANSWER _____

3 The area y of a square with side length x is $y = x^2$. Is this function linear or nonlinear?

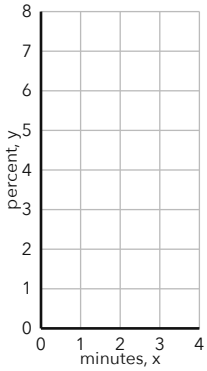
ANSWER _____

4 A savings balance starts at $7 and increases by $5 each week. Sketch y versus x for x = 0 to 3. Is the function linear?

ANSWER _____

APPLY IT Show your work

1 A game update is 0% complete when it starts. It downloads 2 percentage points each minute. On the grid, sketch percent complete y versus minutes x. Is the function linear or nonlinear?



ANSWER _____

2 Read the clock. Jordan starts an online workout at this time. From the start, calories burned increase by 10 each minute. State the start time, then sketch calories y versus minutes x. Is the function linear or nonlinear?



ANSWER _____

CHALLENGE One step up

A music app charges $y = 6 + 3x$ dollars for x downloaded songs. A game gives a bonus total of $y = x^2$ points after x rounds. Which graph is straight for x greater than or equal to 0? Describe how the two graphs differ and explain why.

WORK SPACE AND ANSWER

ANSWER KEY

Function Shape Detectives

GRADE 8 · 8.FGR.5.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For x = 0, 2, 4, 6, the y-values are 9, 13, 17, 21. Is the function linear or nonlinear? State the rate of change.	**Linear; rate of change = 2.**
2	A plant is 11 cm tall and grows 4 cm each week. Is its height versus time linear or nonlinear?	**Linear; it increases by 4 cm each week.**
3	The area y of a square with side length x is $y = x^2$. Is this function linear or nonlinear?	**Nonlinear.**
4	A savings balance starts at $7 and increases by $5 each week. Sketch y versus x for x = 0 to 3. Is the function linear?	**Plot (0, 7), (1, 12), (2, 17), and (3, 22) and draw a straight line. It is linear.**

PART 2 · APPLY IT

1. **Draw a straight line through (0, 0), (1, 2), (2, 4), (3, 6), and (4, 8). The function is linear.** The percent rises by the same amount, 2, each minute. Plot the points and connect them with a straight line.
2. **6:30; sketch a straight line beginning at (0, 0) with rate of change 10. The function is linear.** The clock shows 6:30. Calories increase by a constant 10 per minute, so y = 10x and the graph is a line.

CHALLENGE

The music app graph is straight because it increases by 3 dollars per song, a constant rate. The game bonus graph is curved upward because its rate of change increases as x increases, so it is nonlinear.

Accept equivalent descriptions of a straight line, constant rate, curved graph, or changing rate. For sketches, accept correctly scaled points and a straight line or upward-curving graph as appropriate.