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LESSON 3

Graphs of Functions

8.F.1, 8.F.2, 8.F.3, 8.F.5

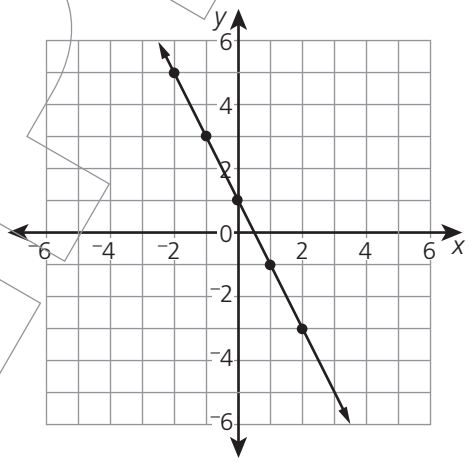
Coordinate points are written in the form (x, y), where x is the input and y is the output.

A function represented as an equation or in table form can also be represented as a graph. The x-coordinates represent the input. The y-coordinates represent the output.

Draw the graph of $y = -2x + 1$.

Make a table of values to find coordinate points for the graph. Choose any x-value for the input and find the corresponding y-value, or output. Then plot the points on a coordinate plane.

x	y
−2	5
−1	3
0	1
1	−1
2	−3



The graph of a linear function is a straight line. The graph of a nonlinear function is a curved line.

The equation of a linear function is in the form $y = mx + b$, where m represents the slope and b represents the y-intercept of the line.

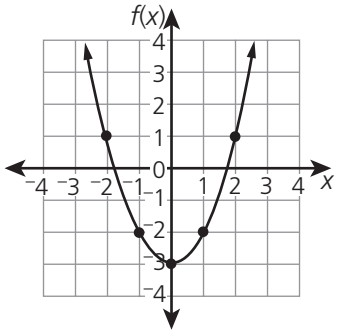
A function is increasing if it moves upward from left to right. It is decreasing if it moves downward from left to right.

A linear function is either increasing everywhere or decreasing everywhere. A nonlinear function can increase and decrease over different intervals, or values, of x.

Functions can be linear or nonlinear. A **linear function** is one where it has the same change in y-values for each change in x-values. A **nonlinear function** has varying changes in x- and y-values.

Draw a graph of the function represented by this table of values. Explain whether the function is linear or nonlinear.

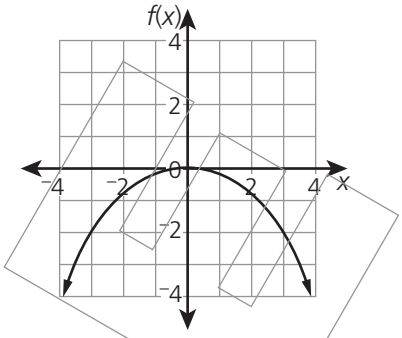
x	$f(x)$
−2	1
−1	−2
0	−3
1	−2
2	1



This function is nonlinear because it is not a straight line.

Read each problem. Circle the letter of the best answer.

SAMPLE Which statement best describes the graph of this function?



A It increases everywhere.

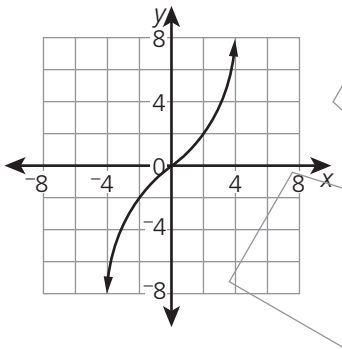
B It decreases everywhere.

C It decreases for all values of *x*.

D It increases for negative values of *x*.

The correct answer is D. This graph shows a nonlinear function that both increases and decreases. The graph increases for all negative values of *x* since it moves upward from left to right for these values. It decreases for all positive values of *x* since it moves downward from left to right for these values.

1 Which table of values matches this graph?



A

x	*y*
−2	2
−1	1
1	−1
2	−2

C

x	*y*
−2	−8
−1	−1
1	1
2	8

B

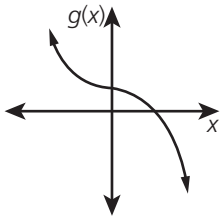
x	*y*
−2	−2
−1	−1
1	1
2	2

D

x	*y*
−8	−2
−1	−1
1	1
8	2

2 Functions $f(x)$ and $g(x)$ are shown below.

x	*f*(*x*)
0	9
1	6
2	3
3	0



Which statement best describes these functions?

A $f(x)$ and $g(x)$ are nonlinear.

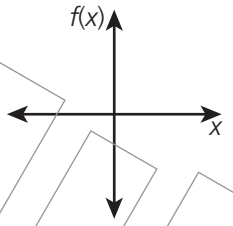
B $f(x)$ is nonlinear and $g(x)$ is linear.

C $f(x)$ and $g(x)$ increase everywhere.

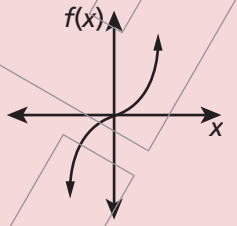
D $f(x)$ and $g(x)$ decrease everywhere.

Read each problem. Write your answer.

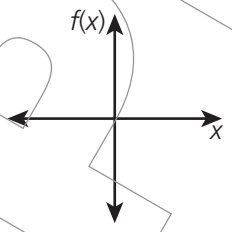
SAMPLE The function $f(x)$ is nonlinear and it increases for all values of x. On the coordinate plane at the right, draw a graph that could represent $f(x)$.



A nonlinear graph is a curved line. A graph that increases for all values of x moves upward from left to right. The graph shown here satisfies both of these conditions.



3 The function $f(x)$ is linear and it decreases for all values of x. On the coordinate plane at the right, draw a graph that could represent $f(x)$.



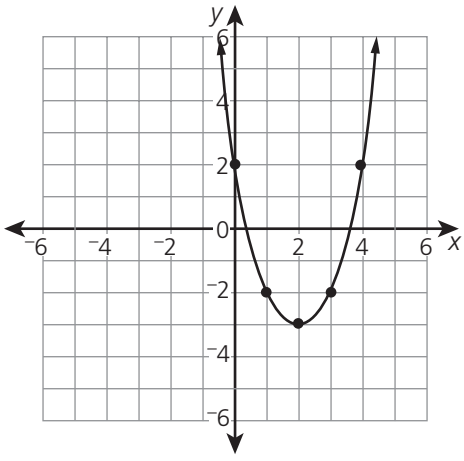
4 The surface area of a cube is represented by the function $A(s) = 6s^2$, where s is the side length of the cube. Explain whether this function is linear or nonlinear.

_____

_____

5 For which values of x is the function graphed here decreasing?

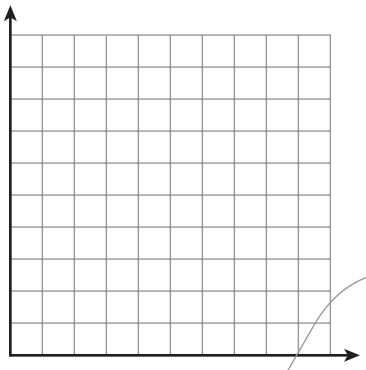
Answer _____



Read the problem. Write your answer to each part.

6 The function $f(x) = 0.6x$ shows the relationship between the original price, x, in dollars, and the discounted price, $f(x)$, in dollars, of all clearance items at Max's Music Store.

Part A Graph this function on the coordinate plane below.



Part B The table of values below shows the relationship between the original price, x, and the discounted price, $f(x)$, of all clearance items at Timmy's Tunes.

x	20	25	30	35
$f(x)$	8	10	12	14

Which store has a better discount, Max's Music Store or Timmy's Tunes? Explain how you know.

Find the discount factors for each store. Compare the change in $f(x)$-values to the change in x-values.