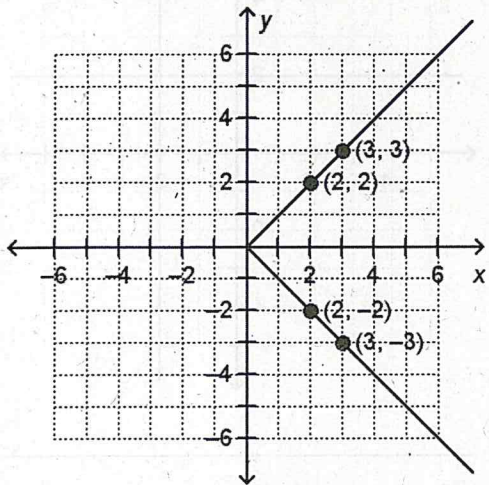


8.F.1

SELECTED RESPONSE

Select the correct answer.

1. Use the graph to explain why y is or is not a function of x .



- (A) y is a function of x because both $(2, 2)$ and $(2, -2)$ have the same x -coordinate.
- (B) y is a function of x because for each y -coordinate, there is exactly one x -coordinate.
- (C) y is not a function of x because both $(2, 2)$ and $(2, -2)$ have the same x -coordinate.
- (D) y is not a function of x because for each x -coordinate, there is exactly one y -coordinate.

2. What is a function?

- (A) A function assigns to each input exactly one output.
- (B) A function assigns to each input at least one output.
- (C) A function assigns outputs to inputs.
- (D) A function assigns to each input more than one output.

3. Explain whether the table represents a function.

Input	Output
-2	4
-1	2
0	0
1	-2
2	-4

- (A) The table represents a function because each input has exactly one output assigned to it.
- (B) The table represents a function because the inputs and outputs are integers.
- (C) The table does not represent a function because there are positive inputs that have negative outputs and there are negative inputs that have positive outputs.
- (D) The table does not represent a function because there are inputs that have more than one output assigned to them.

Select all correct answers.

4. Which of the following sets of ordered pairs (x, y) represent y as a function of x ?

- (A) $\{(1, 2), (1, 3), (1, 4), (1, 5)\}$
- (B) $\{(2.5, 8), (3.5, 8), (2.5, 2), (4.5, 2)\}$
- (C) $\{(-1, 1), (0, 0), (1, 1), (2, 2)\}$
- (D) $\{(-5, -7.0), (-4, -5.6), (-3, -4.2), (-2, -2.8)\}$
- (E) $\{(4, -2), (1, -1), (0, 0), (4, 2)\}$
- (F) $\left\{\left(\frac{1}{2}, 0\right), \left(1, \frac{1}{2}\right), \left(\frac{3}{2}, 1\right), \left(2, \frac{3}{2}\right)\right\}$

CONSTRUCTED RESPONSE

5. Can a function assign multiple inputs to the same output? Explain.

6. Yen says the following set of ordered pairs does not represent a function because the ordered pairs (1, 2) and (3, 2) have different x-values but the same y-value.

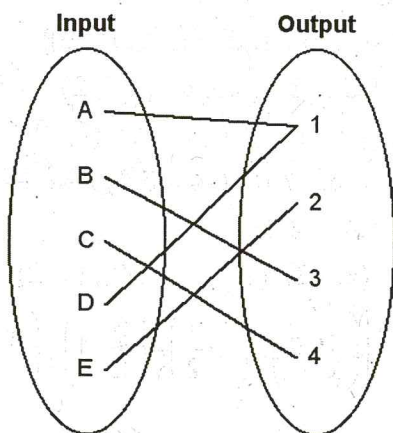
$\{(0, 0), (0, 1), (1, 2), (3, 2)\}$

- a. Is Yen correct about the set not representing a function?

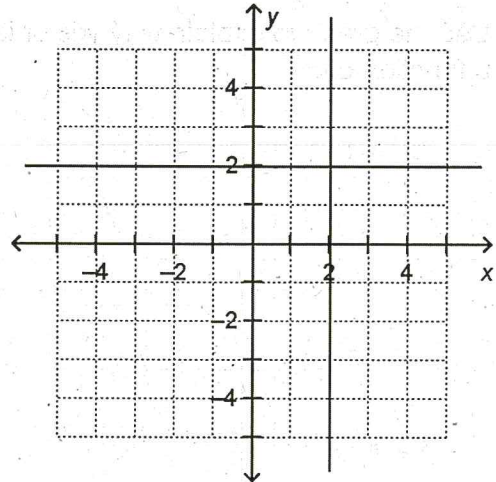
- b. Is Yen's reasoning correct?

If not, explain why and correct her reasoning.

7. Add a line to the mapping diagram so that it no longer represents a function. Explain why it no longer represents a function.



8. A horizontal line and a vertical line are shown. Which line represents a function and which does not? Explain your reasoning.



9. A scientist studying snakes records two sets of data as described below. Tell whether each set of data necessarily represents a function. Explain your reasoning.

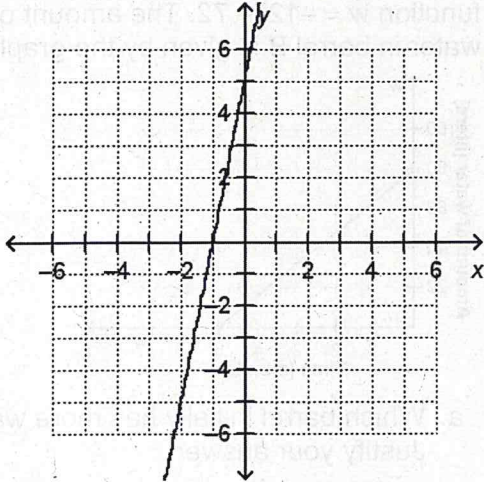
- a. The scientist records the age a , in months, and the length l , in inches, of a single snake over the course of its life. The scientist reports the data in the form (a, l) .

- b. The scientist records, all on the same day, the age a , in months, and the length l , in inches, of each snake in a collection of snakes. The scientist reports the data in the form (a, l) .

8.F.2**SELECTED RESPONSE**

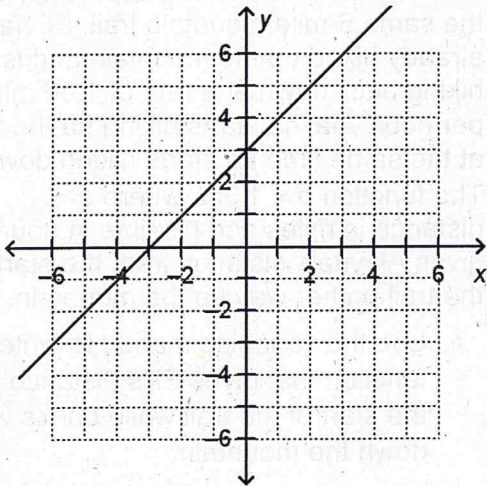
Select the correct answer.

1. Which function's graph has the same x-intercept as the line shown?



- (A) $y = -5x - 5$ (C) $y = 5x - 1$
 (B) $y = -5x + 5$ (D) $y = \frac{1}{5}x + 5$

2. The rate of change for linear function A is $\frac{1}{3}$. Its graph has a y-intercept of 1. The graph below represents function B. What do the graphs of these two functions have in common?



- (A) The point (1, 4)
 (B) The y-intercept
 (C) The slope
 (D) The x-intercept

3. The graph of a linear function passes through the points whose coordinates are given in the table. The graph of which function has the same slope as the graph of the function represented by the table?

x	0	1	2	3
y	-0.5	-0.25	0	0.25

- (A) $y = -0.25x - 2$ (C) $y = 4x - 5$
 (B) $y = 0.25x + 5$ (D) $y = -4x + 3$

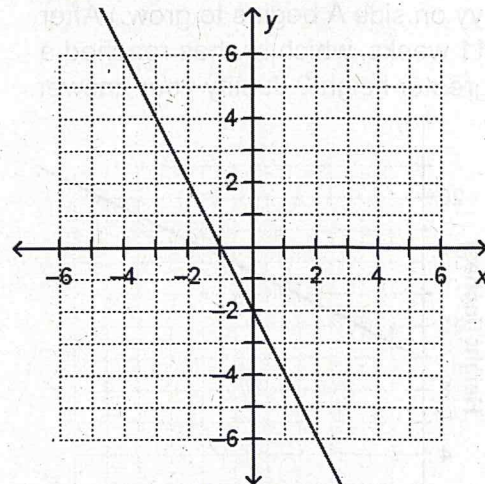
4. The rate of change for linear function A is -6 . Its graph crosses the y-axis at (0, 12). Linear function B is represented by the table shown. What do the graphs of functions A and B have in common?

x	0	2	4	6
y	3	9	15	21

- (A) The y-intercept
 (B) The point (1, 6)
 (C) The x-intercept
 (D) The slope

Select all correct answers.

5. Which functions have graphs that share the x-intercept, y-intercept, or slope with the graph of the function shown?



- (A) $y = 2x - 2$ (D) $y = -2x + 2$
 (B) $y = -\frac{1}{2}x + 2$ (E) $y = \frac{1}{2}x + 2$
 (C) $y = 2x + 2$ (F) $y = \frac{1}{2}x - 2$

CONSTRUCTED RESPONSE

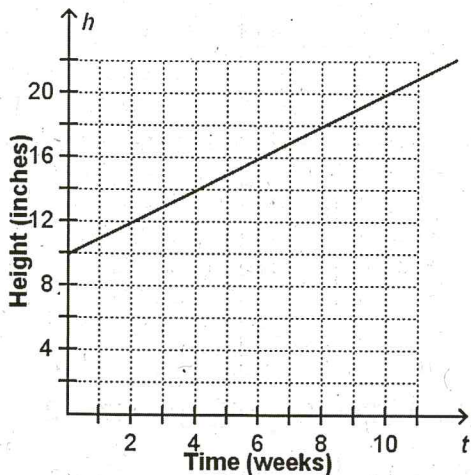
6. Martha and Howard are running at a constant speed in a marathon. Martha runs at 4.5 miles per hour. Howard's progress is shown in the table.

Time (hours)	Distance (miles)
1	5
2	10
3	15

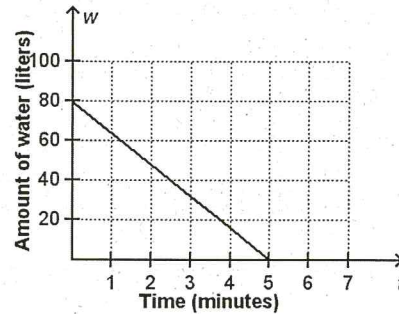
- a. Who runs faster? Explain.

- b. If Martha and Howard are 5 hours into the marathon, how far has each run?

7. Ivy is growing up two sides of a house. Side A is sunny, and side B is shady. The ivy on side A grows up from the ground at a rate of 2 inches per week. At the time that the ivy on side A starts growing, the ivy on side B has already been growing. The graph shows the height h , in inches above the ground, of the ivy growing on side B at time t , in weeks. (Note that on this graph, $t = 0$ is the time at which the ivy on side A begins to grow.) After 11 weeks, which ivy has reached a greater height? Justify your answer.



8. Rain barrels A and B are filled with water. A different pump removes water from each barrel at a different constant rate. The amount of water w , in liters, in barrel A at time t , in minutes, is given by the function $w = -12t + 72$. The amount of water in barrel B is given by the graph.



- a. Which barrel initially has more water? Justify your answer.

- b. Which barrel is emptied at the greater rate? Justify your answer.

- c. Which barrel will be empty first? Justify your answer.

9. Eli and Alayna are hiking separately on the same 6-mile mountain trail. Eli has already hiked up the mountain and is now hiking back down at a rate of 1.65 miles per hour. Alayna starts hiking up the trail at the same time Eli starts hiking down. The function $d = 1.35t$, where d is distance in miles and t is time in hours, gives Alayna's distance from the start of the trail on her way up the mountain.

- a. Use the variables d and t to write a function that gives Eli's distance from the start of the trail while on his way down the mountain.

- b. At what point on the trail do Eli and Alayna meet? Explain.

8.F.3

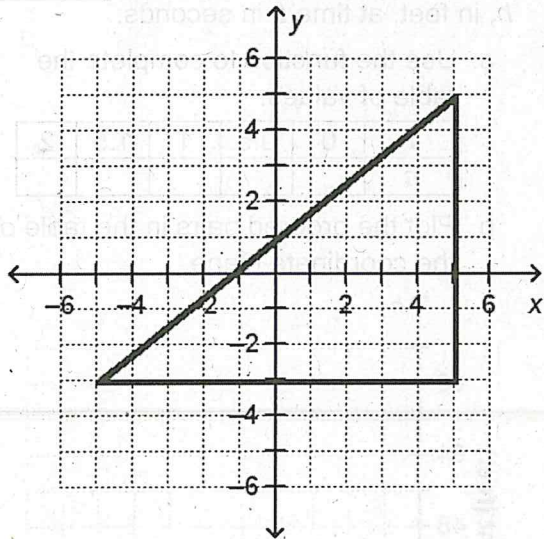
SELECTED RESPONSE

Select the correct answer.

1. Which equation does not represent a linear function?

- (A) $y = 2$ (C) $y = x$
 (B) $y = x^2 + 9$ (D) $y = -8x + 1$

2. In the right triangle shown, the equation for the hypotenuse is $y = \frac{4}{5}x + 1$, the equation for the longer leg is $y = -3$, and the equation for the shorter leg is $x = 5$. Which of these equations, if any, does not represent a linear function?



- (A) The equation for the hypotenuse does not represent a linear function.
 (B) The equation for the longer leg does not represent a linear function.
 (C) The equation for the shorter leg does not represent a linear function.
 (D) Each of the equations represents a linear function.

3. Which points are on the graph of a linear function?

- (A) $(-2, 11)$, $(-1, 9)$, and $(0, 7)$
 (B) $(-1, 2)$, $(0, 3)$, and $(1, 2)$
 (C) $(1, 1)$, $(1, 3)$, and $(1, 6)$
 (D) $(-5, 3)$, $(-3, 0)$, and $(-1, -6)$

Select all correct answers.

4. Which equations represent a function that is not linear?

- (A) $y = 3x + 12$
 (B) $y = -6x + x^2$
 (C) $y = x^2 + 2$
 (D) $y = 10x$
 (E) $y = x^3$
 (F) $y = 9$

Select the correct answer for each lettered part.

5. Indicate whether each equation represents a linear function.

- a. $y = 5x$ Yes No
 b. $y = 2x^2 - 6$ Yes No
 c. $y = -3x + 12$ Yes No
 d. $x + 7y = 21$ Yes No
 e. $xy = 13$ Yes No
 f. $x = -3$ Yes No

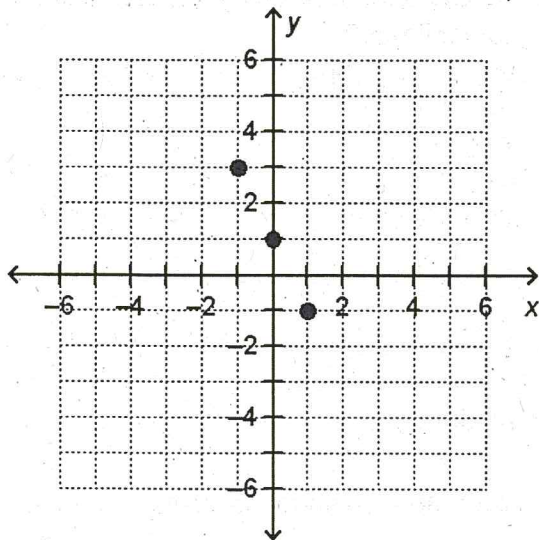
CONSTRUCTED RESPONSE

6. Do the ordered pairs in the table of values represent a linear function? Explain.

x	1	2	3	4	5	6
y	3	6	11	18	27	38

7. Oliver says that the equations $y = 1$ and $x = 1$ both represent linear functions. Is Oliver correct? Explain.

8. Do the three points shown lie on the graph of a linear function? If so, find an equation of the function. If not, explain why not.



9. a. Write $6x - 2y = 0$ in slope-intercept form, if possible.
-
- b. Write $x = 11y - 2$ in slope-intercept form, if possible.
-
- c. Write $4xy = 10$ in slope-intercept form, if possible.
-
- d. Write $x + 2 = 0$ in slope-intercept form, if possible.
-
- e. Which equations represent linear functions? Explain.
-
-
-

10. Vladimir and Cheryl are walking down the street. Vladimir walks at a speed of 4 miles per hour, and Cheryl walks at a speed of 3 miles per hour.

a. Write an equation for the distance d , in miles, each person walks over time t , in hours.

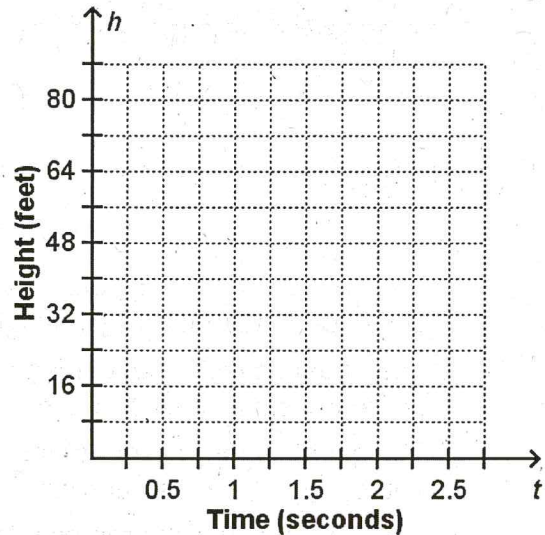
b. Do the equations represent linear functions? Explain.

11. An object is dropped from a height of 64 feet. As it falls, the function $h = 64 - 16t^2$ models the object's height h , in feet, at time t , in seconds.

a. Use the function to complete the table of values.

t	0	0.5	1	1.5	2
h					

b. Plot the ordered pairs in the table on the coordinate plane.



c. Does the equation represent a linear function? Use slope to explain why or why not.

8.F.4

SELECTED RESPONSE

Select the correct answer.

1. Vincent's savings over several weeks are shown in the table. If a linear function models Vincent's savings over time, how much money did he initially have?

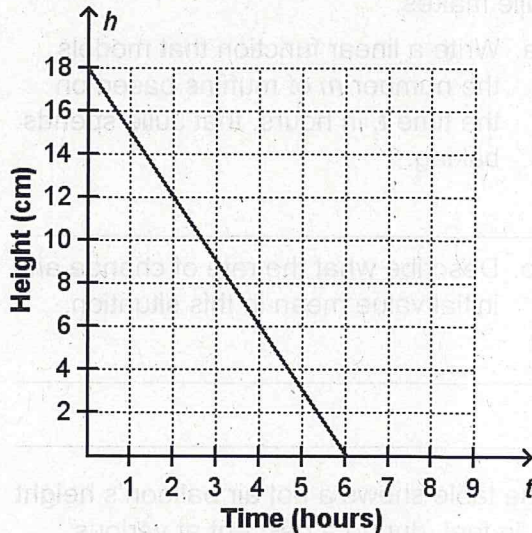
Time (weeks)	2	4	6	8	10
Savings (dollars)	75	115	155	195	235

- (A) \$0 (C) \$35
 (B) \$20 (D) \$75
2. Lynn is walking from her house to the grocery store. The table shows the distance she has left to walk. What is the rate of change for the linear function represented by the table?

Time (minutes)	Distance (blocks)
2	9
4	8
6	7
8	6

- (A) -2 blocks per minute
 (B) -0.5 block per minute
 (C) 0.5 block per minute
 (D) 2 blocks per minute

3. The graph shows a burning candle's height h , in centimeters, at time t , in hours. What linear function does the graph represent?



- (A) $h = -3t + 18$ (C) $h = -3t + 6$
 (B) $h = 3t + 18$ (D) $h = 3t + 6$
4. The table shows the average number s of sandwiches a deli sells over time t , in minutes. What linear function does the table represent?

Time (minutes)	3	6	9	12
Sandwiches sold	19	25	31	37

- (A) $s = -2t + 13$ (C) $s = 2t$
 (B) $s = 13t + 2$ (D) $s = 2t + 13$

Sue likes to hike and scuba dive. Match each description of Sue's activity with the function modeling Sue's elevation E , in feet, at time t , in minutes.

- | | |
|--|---------------------------|
| _____ 5. While hiking on a hill, Sue starts at an elevation of 100 feet and ascends at a rate of 20 feet per minute. | A $E = 20t$ |
| _____ 6. While scuba diving, Sue starts at an elevation of 100 feet below sea level and ascends at a rate of 20 feet per minute. | B $E = 20t + 100$ |
| _____ 7. While hiking on a hill, Sue starts at an elevation of 100 feet and descends at a rate of 20 feet per minute. | C $E = 20t - 100$ |
| _____ 8. While scuba diving, Sue starts at sea level and descends at a rate of 20 feet per minute. | D $E = -20t$ |
| | E $E = -20t + 100$ |
| | F $E = -20t - 100$ |

CONSTRUCTED RESPONSE

9. Julie is making muffins for a bake sale. It takes her 30 minutes to make a dozen muffins. Tim had already made 36 muffins, which he adds to the amount Julie makes.

a. Write a linear function that models the number m of muffins based on the time t , in hours, that Julie spends baking.

b. Describe what the rate of change and initial value mean in this situation.

10. The table shows a hot air balloon's height h , in feet, during a descent at various times t , in seconds.

Time (seconds)	Height (feet)
5	1150
10	1090
15	1030
20	970
25	910

a. Use the table's first two ordered pairs to find the hot air balloon's rate of change.

b. Is the rate of change constant? Explain.

c. What was the hot air balloon's height at the time the descent began?

d. Write h as a linear function of t .

11. Jamal owns a computer store. He is tracking his profits from a new computer game he is selling. The table shows Jamal's profits according to how many games were sold.

Games sold	Profit (dollars)
2	-400
4	-360
6	-320
8	-280

He finds the linear function that models

his profit p , in dollars, to be $p = \frac{1}{20}g + 22$,

where g is the number of computer games sold. His work for finding the rate of change and initial value is shown below.

Rate of change:

$$\frac{4 - 2}{-360 - (-400)} = \frac{2}{40} = \frac{1}{20}$$

Initial value: $p = mg + b$

$$2 = \frac{1}{20}(-400) + b$$

$$2 = -20 + b$$

$$22 = b$$

a. Identify and correct Jamal's error. Write the function that actually models the profit. Show your work.

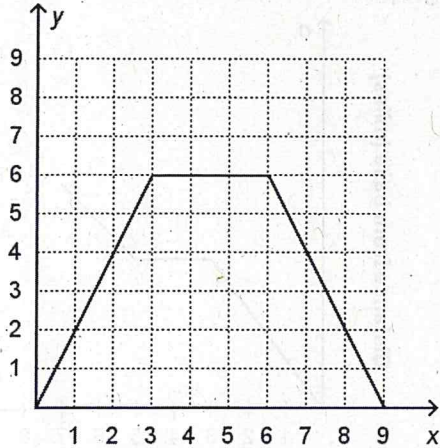
b. Interpret the rate of change and the initial value found in part a using the fact that profit is the difference between income and expenses.

c. How many games will Jamal need to sell to break even? Explain. Show your work.

8.F.5**SELECTED RESPONSE**

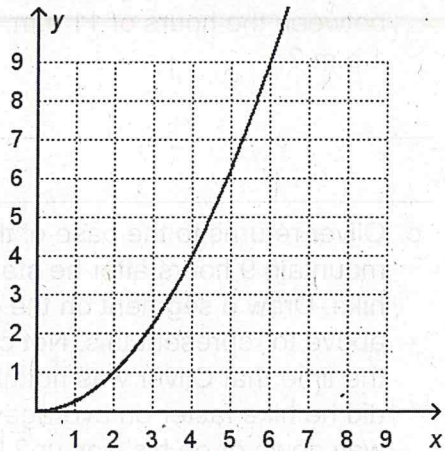
Select the correct answer.

1. In the graph of the function, for what values of x is y increasing?



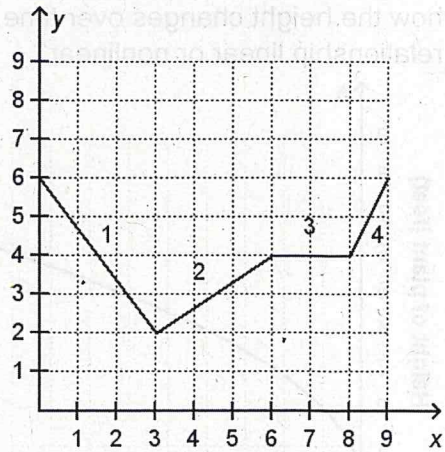
- (A) Between $x = 0$ and $x = 3$
 (B) Between $x = 3$ and $x = 6$
 (C) Between $x = 6$ and $x = 9$
 (D) The function is never increasing.

2. What words best describe the function whose graph is shown?



- (A) Increasing and linear
 (B) Increasing and nonlinear
 (C) Decreasing and linear
 (D) Decreasing and nonlinear

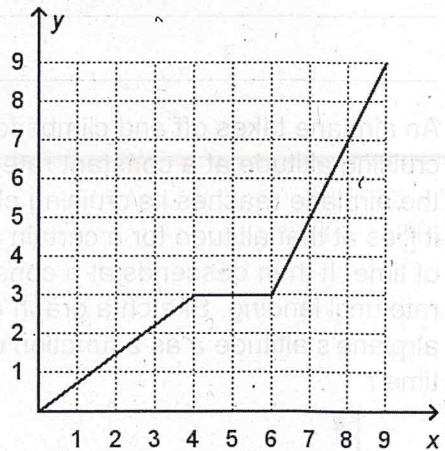
3. What segment of the graph shows the function having a constant value?



- (A) Segment 1 (C) Segment 3
 (B) Segment 2 (D) Segment 4

Select all correct answers.

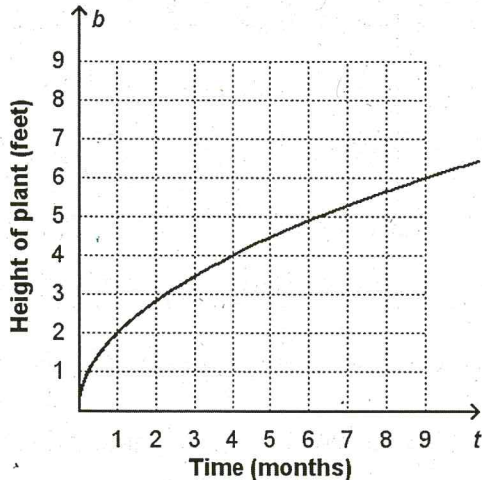
4. What words describe y as a function of x in the graph below?



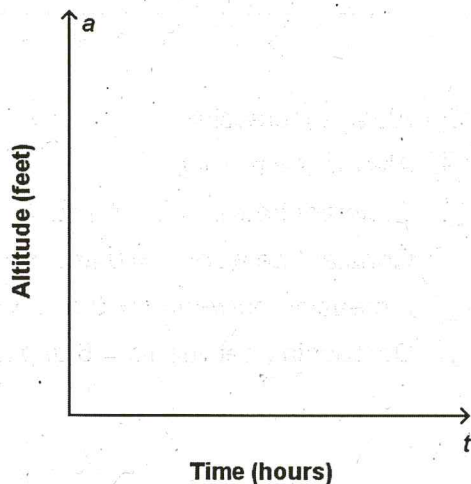
- (A) Always increasing
 (B) Always decreasing
 (C) Constant between $x = 4$ and $x = 6$
 (D) Constant between $x = 0$ and $x = 4$
 (E) Increasing between $x = 0$ and $x = 4$
 (F) Decreasing between $x = 6$ and $x = 9$

CONSTRUCTED RESPONSE

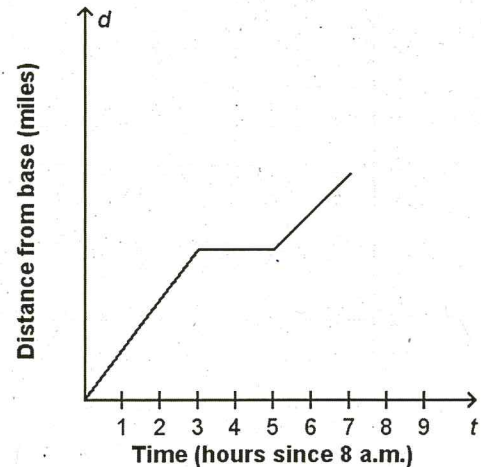
5. The graph below shows the height h , in feet, of a plant over t months. Describe how the height changes over time. Is the relationship linear or nonlinear?



6. An airplane takes off and climbs to its cruising altitude at a constant rate. Once the airplane reaches its cruising altitude, it flies at that altitude for a certain amount of time. It then descends at a constant rate until landing. Sketch a graph of the airplane's altitude a as a function of time t .



7. Oliver is hiking a trail that takes him straight up a mountain. He starts his hike at 8 a.m. at the base of the mountain. The distance d , in miles, that Oliver is from the base of the mountain t hours after starting his hike is shown in the graph.



- a. Between what times is the slope positive? Interpret the meaning of this in the context of the situation.

- b. What is the meaning of the slope between the hours of 11 a.m. and 1 p.m.?

- c. Oliver returns to the base of the mountain 9 hours after he started his hike. Draw a segment on the graph above to represent this. Not counting the time that Oliver was not hiking, did he hike faster on average on his way down or on his way up? How do you know?
