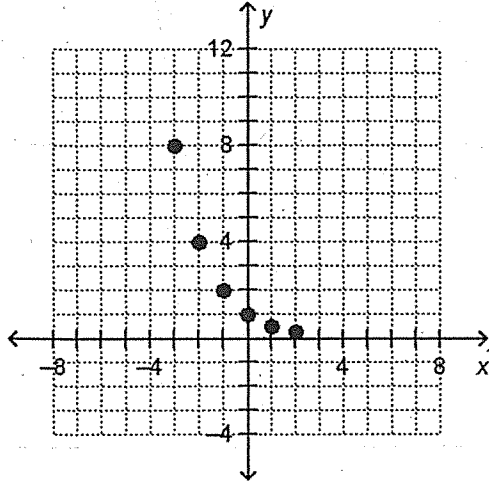


**F.IF.1****SELECTED RESPONSE**

Select the correct answer.

1. What are the domain and range of the function  $y = f(x)$  as shown on the graph?



- (A) The domain is  $\{0.25, 0.5, 1, 2, 4, 8\}$ , and the range is  $\{-3, -2, -1, 0, 1, 2\}$ .
- (B) The domain is  $\{-3, -2, -1, 0, 1, 2\}$  and the range is  $\{0.25, 0.5, 1, 2, 4, 8\}$ .
- (C) The domain is all real numbers between  $-3$  and  $2$ , and the range is all real numbers between  $0.25$  and  $8$ .
- (D) The domain is all real numbers between  $0.25$  and  $8$ , and the range is all real numbers between  $-3$  and  $2$ .
2. The linear function  $f(x)$  has the domain  $x \geq 5$ . Which of the following does not represent an element of the range?

- (A)  $f\left(2\frac{1}{2}\right)$
- (B)  $f(5)$
- (C)  $f(10.5868)$
- (D)  $f(100,000)$

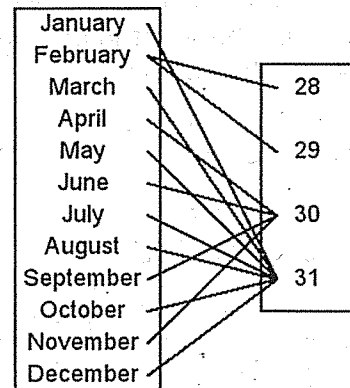
Select all correct answers.

3. The domain of the function  $f(x)$  is the set of integers greater than  $-5$ . Which of the following values represent elements of the range of  $f$ ?

- (A)  $f(4.8)$       (E)  $f\left(\frac{1}{2}\right)$
- (B)  $f(-2)$       (F)  $f(0)$
- (C)  $f(-5)$       (G)  $f(14)$
- (D)  $f(8)$       (H)  $f(-18)$

**CONSTRUCTED RESPONSE**

4. Examine the two sets below. The first is the set of months in the year and the second is the possible numbers of days per month. Is the relation that maps the month to its possible number of days a function? Explain.




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5. Does the table represent a function? If so, state the domain and range. If not, state why.

$x$	$f(x)$
-2	2
-1	6
0	10
1	14
2	18

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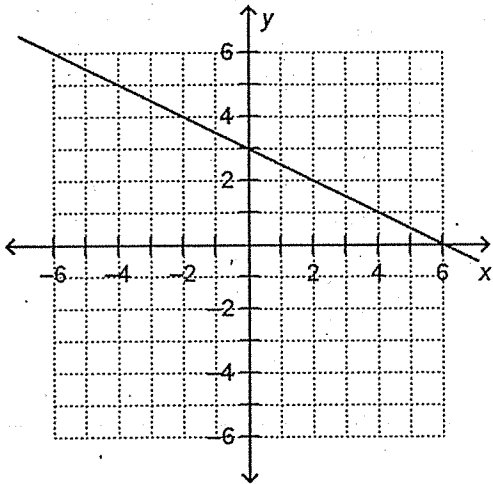
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6. The graph of  $y = -\frac{1}{2}x + 3$  is shown below. Use the graph to find the  $y$ -values associated with  $x = -2$ ,  $x = 0$ , and  $x = 2$ . If  $y = f(x)$  is a function, which of the values given above are in the range and which are in the domain?




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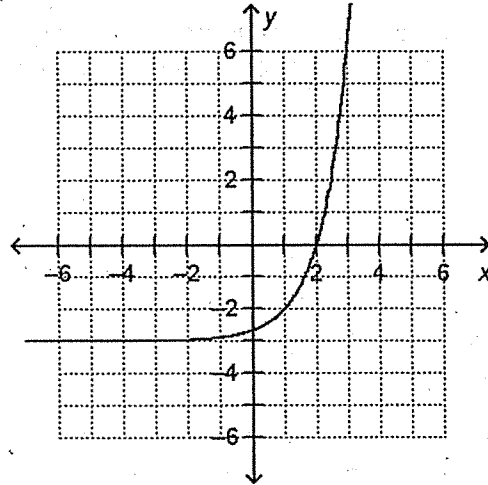
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7. An exponential function  $y = f(x)$  is graphed below. The graph has a horizontal asymptote at  $y = -3$ . What are the domain and range of  $f(x)$ ?




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8. Determine whether the following situations represent functions. Explain your reasoning. If the situation represents a function, give the domain and range.

a. Each U.S. coin is mapped to its monetary value.

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b. A \$1, \$5, \$10, \$20, \$50, or \$100 bill is mapped to all the sets of coins that are the same total value as the bill.

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## F.IF.2

### SELECTED RESPONSE

Select the correct answer.

- What is the value of the function  $f(x) = x^2 - 5x + 2$  evaluated at  $x = 2$ ?
  - (A) -4
  - (B) 2
  - (C) 6
  - (D) 16
- Joshua is driving to the store. The average distance  $d$ , in miles, he travels over  $t$  minutes is given by the function  $d(t) = 0.5t$ . What is the value of the function when  $t = 15$ ?
  - (A) 75 miles
  - (B) 7.5 minutes
  - (C) 7.5 miles
  - (D) 15 minutes
- Marcello is tiling his kitchen floor with 45 square tiles. The tiles come in whole-number side lengths of 6 to 12 inches. The function  $A(s) = 45s^2$ , where  $s$  is the side length of the tile, represents the area that Marcello can cover with the tiles. What is the domain of this function?
  - (A) All real numbers between 6 and 12, inclusive
  - (B) All rational numbers between 6 and 12, inclusive
  - (C) {6, 7, 8, 9, 10, 11, 12}
  - (D) {6, 12}

Select all correct answers.

- Which values are in the domain of the function  $f(x) = -6x + 11$  with a range  $\{-37, -25, -13, -1\}$ ?
  - (A) 1
  - (B) 2
  - (C) 3
  - (D) 4
  - (E) 5
  - (F) 6
  - (G) 7
  - (H) 8

### CONSTRUCTED RESPONSE

- The production cost for  $g$  graphing calculators is  $C(g) = 25g$ . Evaluate the function at  $g = 15$ . What does the value of the function at  $g = 15$  represent?

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- The domain of the function  $f(x) = 13x - x^2$  is given as  $\{-2, -1, 0, 1, 2\}$ . What is the range? Show your work.

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7. Victor needs to find the volume of cube-shaped containers with side lengths ranging from 2 feet to 7 feet. The side lengths of the containers can only be whole numbers. The volume of a container with side length  $s$  is given by  $V(s) = s^3$ .

a. What is the domain of the function?

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b. Evaluate the function at each value in the domain. Show your work.

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8. A store selling televisions is calculating the profit for one model. Currently, the store has 25 televisions in stock. The store bought these televisions from a supplier for \$99.50 each. Each television will be sold for \$149.99.

a. Write a profit function in terms of  $n$ , the number of televisions sold.

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b. What is the domain of the function? Explain.

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c. If the store sold all of the televisions in stock, how much would the profit be?

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9. Tanya is printing a report. There are 100 sheets of paper in the printer, and the number of sheets  $p$  left after  $t$  minutes of printing is given by the function  $p(t) = -8t + 100$ .

a. How long would it take the printer to use all 100 sheets of paper? Explain how you found your answer.

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b. What is the domain of the function? Explain.

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c. What is the range of the function? Explain.

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d. Tanya's report takes 7 minutes to print. How long is Tanya's report? Show your work.

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### F.IF.3

#### SELECTED RESPONSE

Select the correct answer.

- Which function below generates the sequence  $-2, 0, 2, 4, 6, \dots$ ?
  - (A)  $f(n) = n - 2$ , where  $n \geq 0$  and  $n$  is an integer.
  - (B)  $f(n) = 2n - 2$ , where  $n \geq 0$  and  $n$  is an integer.
  - (C)  $f(n) = -2n + 2$ , where  $n \geq 1$  and  $n$  is an integer.
  - (D)  $f(n) = 2n$ , where  $n \geq 0$  and  $n$  is an integer.
- The sequence  $-1, 2, 7, 14, \dots$  can be generated by the function  $f(n) = n^2 - 2$ . What is the domain of the function?
  - (A) The domain is the set of all positive real numbers.
  - (B) The domain is the set of all real numbers greater than 1.
  - (C) The domain is the set of integers  $n$  such that  $n \geq 0$ .
  - (D) The domain is the set of integers  $n$  such that  $n \geq 1$ .

Select all correct answers.

- Which of the functions below could be used to generate the sequence  $1, 2, 4, 8, 16, 32, \dots$ ?
  - (A)  $f(n) = 2^n$ , where  $n \geq 0$  and  $n$  is an integer.
  - (B)  $f(n) = 2^n$ , where  $n \geq 1$  and  $n$  is an integer.
  - (C)  $f(1) = 1, f(n) = 2(f(n - 1))$ , where  $n \geq 2$  and  $n$  is an integer.
  - (D)  $f(n) = 2(n - 1)$ , where  $n \geq 1$  and  $n$  is an integer.
  - (E)  $f(n) = n^2$ , where  $n \geq 1$  and  $n$  is an integer.

Match each sequence with a function that generates it.

- |          |  |   |   |
|----------|--|---|---|
| _____ 4. | $4, 12, 24, 40, 60, \dots$                                     | A | $f(n) = 3n, n \geq 1$ and $n$ is an integer.                                  |
| _____ 5. | $0, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots$ | B | $f(n) = 2n(n + 1), n \geq 1$ and $n$ is an integer.                           |
| _____ 6. | $48, 24, 12, 6, 3, \dots$                                      | C | $f(n) = 2(n + 2), n \geq 0$ and $n$ is an integer.                            |
| _____ 7. | $3, 6, 9, 12, 15, \dots$                                       | D | $f(n) = \frac{n-1}{n}, n \geq 1$ and $n$ is an integer.                       |
| _____ 8. | $3, 6, 11, 18, 27, \dots$                                      | E | $f(n) = n^2 + 2, n \geq 1$ and $n$ is an integer.                             |
|          |  | F | $f(1) = 48$ and $f(n) = \frac{1}{2}f(n - 1), n \geq 2$ and $n$ is an integer. |
|          |  | G | $f(1) = 48$ and $f(n) = 2f(n - 1), n \geq 2$ and $n$ is an integer.           |
|          |  | H | $f(n) = \frac{n}{n+1}, n \geq 1$ and $n$ is an integer.                       |

**CONSTRUCTED RESPONSE**

9. Consider the sequence 1, 2, 5, 10, 17, ...

- a. Write a quadratic function  $f(n)$  that generates the sequence. Assume that the domain of the function is the set of integers  $n \geq 0$ .

- b. Use your result from part a to determine the 15th term of the sequence.

10. The domain of a function  $f$  defining the sequence  $\frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \dots$  is the set of consecutive integers starting with 1.

- a. What is  $f(3)$ ? Explain.

- b. How does your answer to part a change if the domain of the function is the set of consecutive integers starting with 0?

11. The Fibonacci sequence is

1, 1, 2, 3, 5, 8, 13, 21, ...

- a. Write a recursive function to describe the terms of the Fibonacci sequence. Begin with the conditions  $f(0) = f(1) = 1$  and  $f(2) = f(1) + f(0)$ .

- b. Suppose the first two terms of the Fibonacci sequence were  $f(0) = 2$  and  $f(1) = 2$ , instead of  $f(0) = 1$  and  $f(1) = 1$ . Write the first 5 terms of the sequence.

- c. Explain how you can modify your answer from part a to describe the terms of the sequence found in part b.

12. Consider the sequence 1, 3, 5, 7, 9, ...

- a. Write a function describing the sequence whose domain is the set of consecutive integers starting with 1.

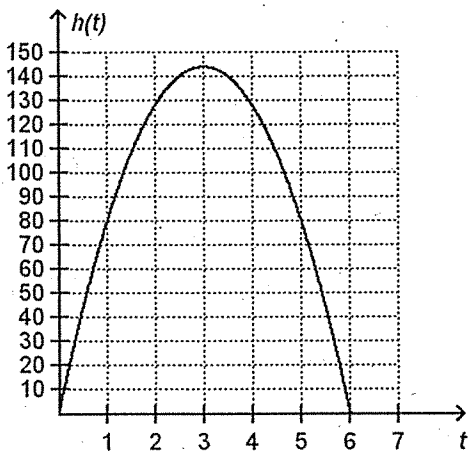
- b. Write a recursive function describing the sequence.

### F.IF.4\*

#### SELECTED RESPONSE

Select the correct answer.

1. The graph shows the height  $h(t)$  of a model rocket  $t$  seconds after it is launched from the ground at 48 feet per second. Where is the height of the rocket increasing? Where is it decreasing?



- (A) The height of the rocket is always increasing.
- (B) The height of the rocket is always decreasing.
- (C) The height of the rocket is increasing when  $0 < t < 3$  and decreasing when  $3 < t < 6$ .
- (D) The height of the rocket is increasing when  $3 < t < 6$  and decreasing when  $0 < t < 3$ .

#### CONSTRUCTED RESPONSE

3. Martha's text message plan costs \$15.00 for the first 1000 text messages sent plus \$0.25 per text over 1000 sent. Let  $C(t)$  represent the cost of sending  $t$  text messages over 1000. Sketch a graph of this relationship, and find and interpret the  $C(t)$ -intercept.

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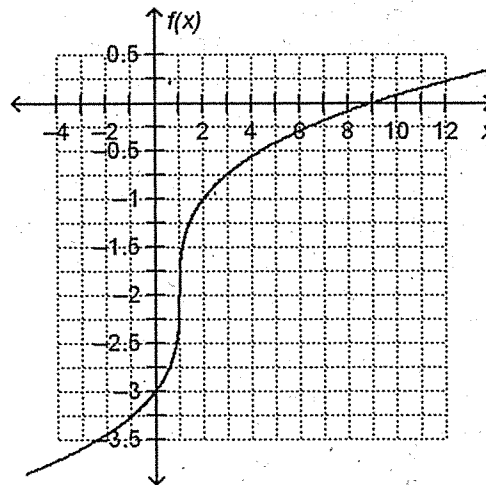
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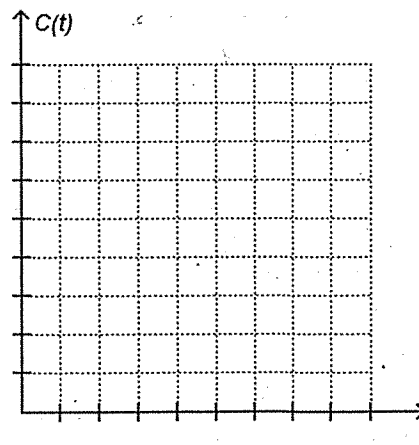
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Select all correct answers.

2. Choose all the statements that are true about the graph.



- (A) The x-intercept is 9.
- (B) The y-intercept is -2.
- (C)  $f(x)$  is increasing when  $x < 1$ .
- (D)  $f(x)$  is decreasing when  $x > 1$ .
- (E)  $f(x)$  has a local maximum at  $(1, -2)$ .
- (F)  $f(x)$  has a local minimum at  $(1, -2)$ .
- (G)  $f(x)$  is negative when  $x < 9$ .
- (H)  $f(x)$  is positive when  $x > -2$ .







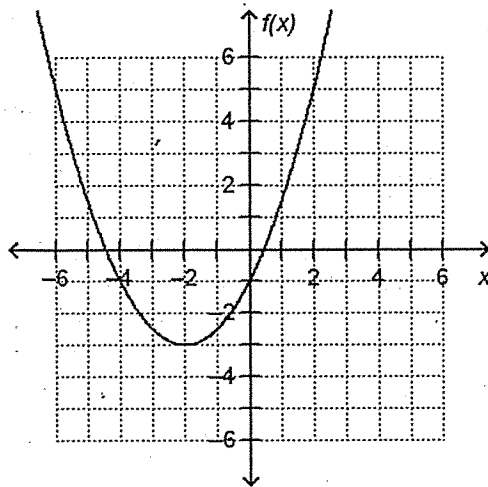
**F.IF.5\*****SELECTED RESPONSE**

Select the correct answer.

1. The function  $h(n)$  gives the number of person-hours it takes to assemble  $n$  engines in a factory. What is a reasonable domain for  $h(n)$ ?

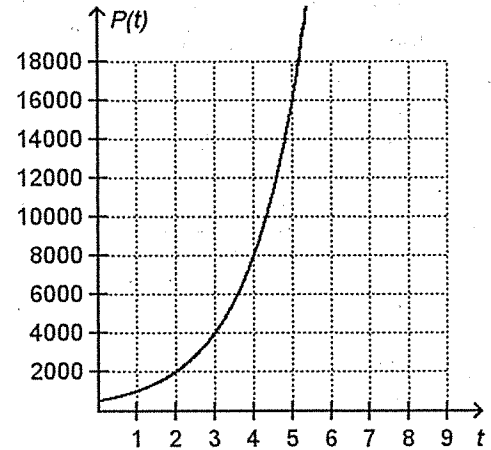
- (A) The nonnegative rational numbers  
 (B) The real numbers  
 (C) The nonnegative integers  
 (D) The nonnegative real numbers

2. The graph of the quadratic function  $f(x)$  is shown below. What is the domain of  $f(x)$ ?



- (A) The integers greater than  $-3$ .  
 (B) The real numbers greater than  $-3$ .  
 (C) The integers  
 (D) The real numbers

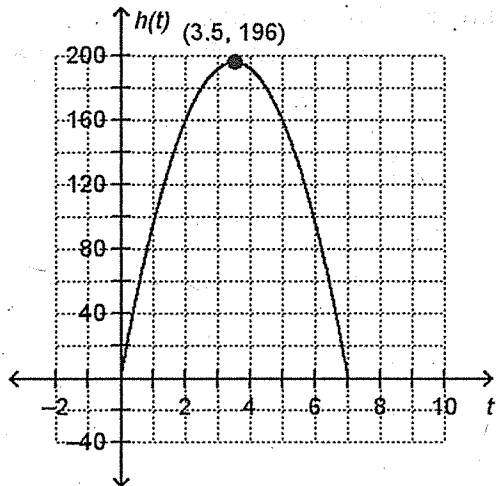
3. The growth of a population of bacteria can be modeled by an exponential function. The graph models the population of the bacteria colony  $P(t)$  as a function of the time  $t$ , in weeks, that has passed. The initial population of the bacteria colony was 500. What is the domain of the function? What does the domain represent in this context?



- (A) The domain is the real numbers greater than 500. The domain represents the time, in weeks, that has passed.  
 (B) The domain is the real numbers greater than 500. The domain represents the population of the colony after a given number of weeks.  
 (C) The domain is the nonnegative real numbers. The domain represents the time, in weeks, that has passed.  
 (D) The domain is the nonnegative real numbers. The domain represents the population of the colony after a given number of weeks.

### CONSTRUCTED RESPONSE

4. The function  $h(t)$  describes the height, in feet, of an object at time  $t$ , in seconds, when it is launched upward from the ground at an initial speed of 112 feet per second.



- a. Find the domain.

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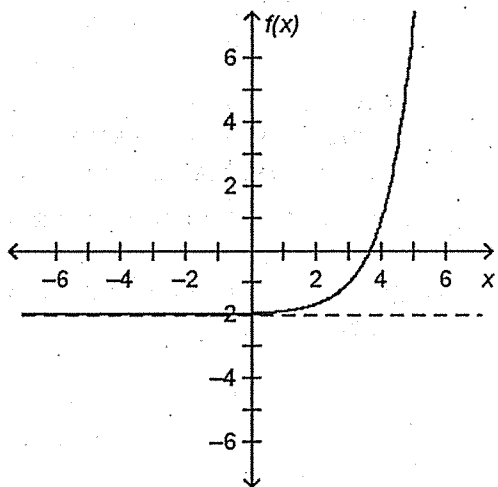
b. What does the domain mean in this context?

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5. What are the domain and range of the exponential function  $f(x)$ ?




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6. An electronics store sells a certain brand of tablet computer for \$500. To stock the tablet computers, the store pays \$150 per unit. The store also spends \$1800 setting up a special display area to promote the product.

- a. Write a function rule to describe the profit earned from selling the tablet computers. Note that profit is the revenue earned minus the cost.

- b. What is a reasonable domain for the function? Explain.

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- c. What are the first eight values in the range of the function? (Start with the range value that corresponds to the least value in the domain.)

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7. A grocery store sells two brands of ham by the pound. Brand A costs \$4.19 per pound, and brand B costs \$4.79 per pound. Brand A can be purchased at the deli in any amount, whereas brand B comes in prepackaged containers of either 0.5 pound or 1 pound. Write a function rule that represents the revenue earned for each of the brands and determine a reasonable domain for each. Explain your answers.

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### F.IF.6\*

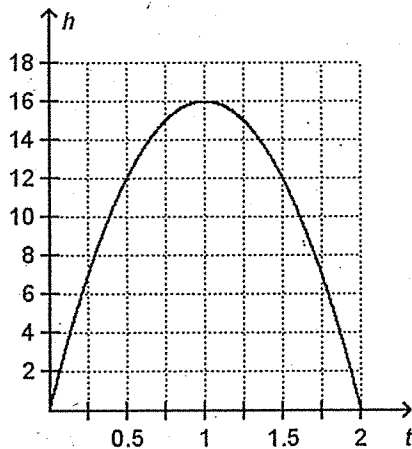
#### SELECTED RESPONSE

Select the correct answer.

1. The table shows the height of a sassafras tree at each of two ages. What was the tree's average rate of growth during this time period?

Age (years)	Height (meters)
4	2
10	5

- (A) 0.4 meter per year  
 (B) 0.5 meter per year  
 (C) 2 meters per year  
 (D) 2.5 meters per year
2. The graph shows the height  $h$ , in feet, of a football at time  $t$ , in seconds, from the moment it was kicked at ground level. Estimate the average rate of change in height from  $t = 1.5$  seconds to  $t = 1.75$  seconds.



- (A) -20 feet per second  
 (B) -12 feet per second  
 (C) 12 feet per second  
 (D) 20 feet per second

3. Find the average rate of change of the function  $f(x) = 2\sqrt{x-5} + 3$  from  $x = 9$  to  $x = 21$ .

- (A) -3                       (C)  $\frac{1}{3}$   
 (B)  $-\frac{1}{3}$                        (D) 3

Select all correct answers.

4. A person's body mass index (BMI) is calculated by dividing the person's mass in kilograms by the person's height in meters. The table shows the median BMI for U.S. males from age 2 to age 12. For which intervals is the average rate of change in the BMI positive?

Age (years)	Median BMI
2	16.575
4	15.641
6	15.367
8	15.769
10	16.625
12	17.788

- (A) age 2 to age 4  
 (B) age 4 to age 6  
 (C) age 6 to age 8  
 (D) age 8 to age 10  
 (E) age 10 to age 12

Select the correct answer for each lettered part.

5. Determine whether each function's average rate of change on the interval  $x = 0$  to  $x = 2$  is equal to 2.
- a.  $f(x) = x + 2$                        Yes                       No  
 b.  $f(x) = 2x$                                Yes                       No  
 c.  $f(x) = \frac{x}{2}$                                Yes                       No  
 d.  $f(x) = x^2$                                Yes                       No  
 e.  $f(x) = 2^x$                                Yes                       No

**CONSTRUCTED RESPONSE**

6. The table gives the minutes of daylight on the first and last day of October 2012 for Anchorage, Alaska, and Los Angeles, California.

Location	Daylight on Oct. 1	Daylight on Oct. 31
Anchorage	686	517
Los Angeles	711	650

a. Calculate the average rate of change, in minutes per day, of daylight during October for each location.

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b. Interpret your answers from part a. In other words, how are the day lengths changing in Anchorage and Los Angeles in October?

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c. The sun rises at 7:00 A.M. on October 17, 2012, in Los Angeles. Estimate the time at which the sun sets that day. Explain your reasoning and show your work.

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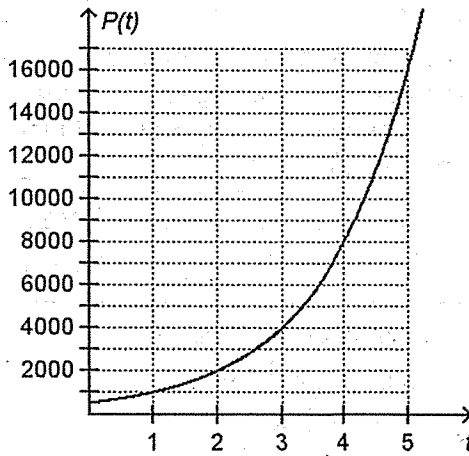


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7. The graph models the population  $P(t)$  of a bacteria colony as a function of time  $t$ , in weeks.



a. Determine the average growth rate between weeks 2 and 3.

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b. Determine the average growth rate between weeks 3 and 4.

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c. Determine the average growth rate between weeks 4 and 5.

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d. What is happening to the average growth rate as each week passes? Justify your answer.

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e. What do you think the average growth rate will be between weeks 5 and 6 if the pattern continues?

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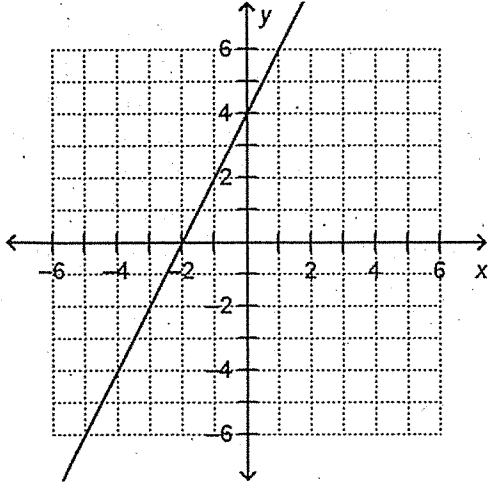


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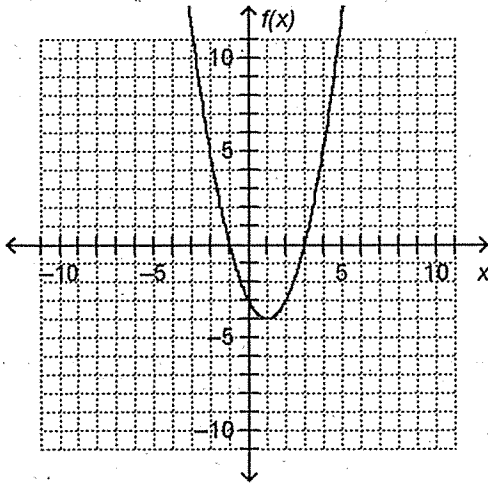
**F.IF.7a\*****SELECTED RESPONSE**

Select the correct answer.

1. What are the intercepts of the linear function shown?



- Ⓐ x-intercept:  $-2$ ; y-intercept:  $-2$   
 Ⓑ x-intercept:  $-2$ ; y-intercept:  $4$   
 Ⓒ x-intercept:  $2$ ; y-intercept:  $4$   
 Ⓓ x-intercept:  $2$ ; y-intercept:  $-4$
2. What is the vertex of the quadratic function  $f(x)$ ? Is it a maximum or a minimum?



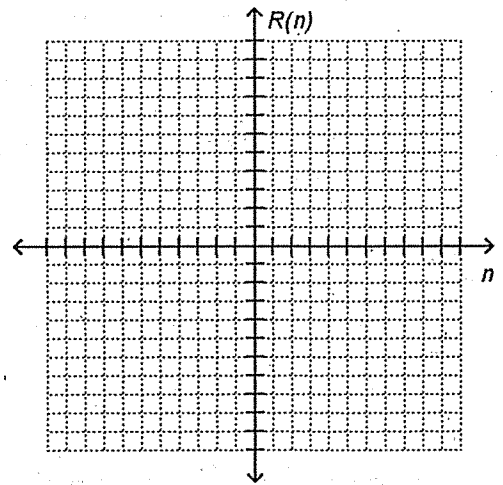
- Ⓐ  $(1, -4)$ ; minimum  
 Ⓑ  $(0, -3)$ ; minimum  
 Ⓒ  $(-1, 0)$ ; minimum  
 Ⓓ  $(3, 0)$ ; maximum

**CONSTRUCTED RESPONSE**

3. Sally decides to make and sell necklaces to earn money to buy a new computer. She plans to charge \$5.25 per necklace.
- a. Write a function that describes the revenue  $R(n)$ , in dollars, Sally will earn from selling  $n$  necklaces.

- b. What is a reasonable domain for this function?

- c. Graph the function.



- d. Identify and interpret the intercepts of the function.

4. The function  $h(t) = -4.9t^2 + 24.5t$  models the height  $h(t)$ , in meters, of an object  $t$  seconds after it is thrown upward from the ground with an initial velocity of 24.5 meters per second.

a. Calculate and interpret the intercepts of the function.

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b. Calculate the vertex of the function.

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c. Is the vertex a minimum or a maximum? What does this mean in this context?

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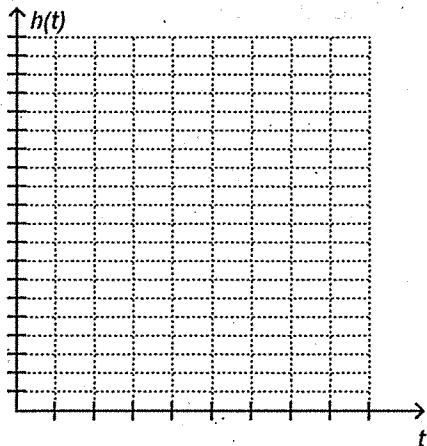


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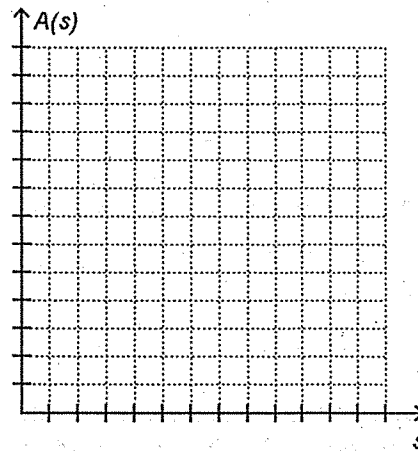


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d. Plot the points found in parts a and b and then graph the function.



5. A farmer has 1200 feet of fencing to enclose a square area for his horses and a rectangular area for his pigs. The farmer decides that the enclosures should share a full side to maximize the usefulness of the fencing. He also wants to maximize the combined area of the enclosures. Write a function that describes the combined area of the enclosures  $A(s)$  as a function of the side length  $s$  of the square enclosure. Then, graph the function to determine dimensions of each enclosure that maximize the combined area. Explain your answer.




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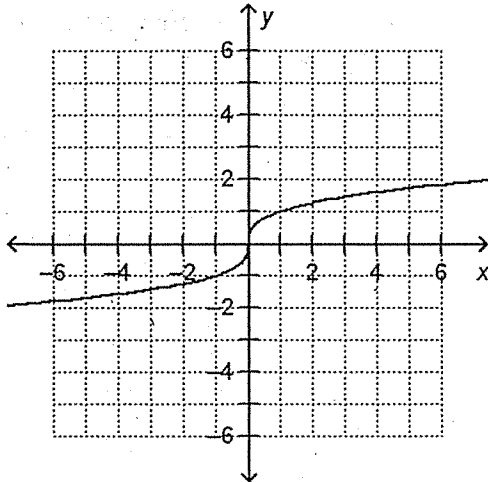


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**F.IF.7b\*****SELECTED RESPONSE**

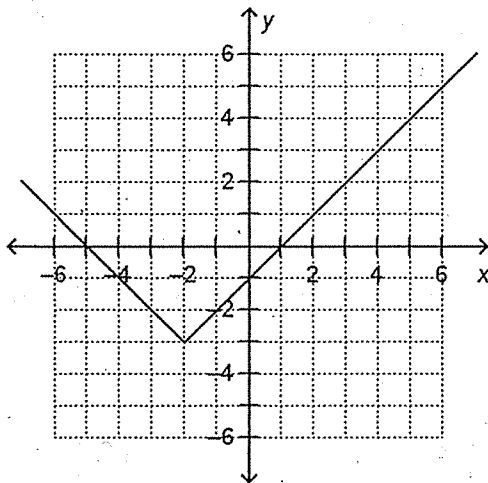
Select the correct answer.

1. What kind of function best describes the following graph?



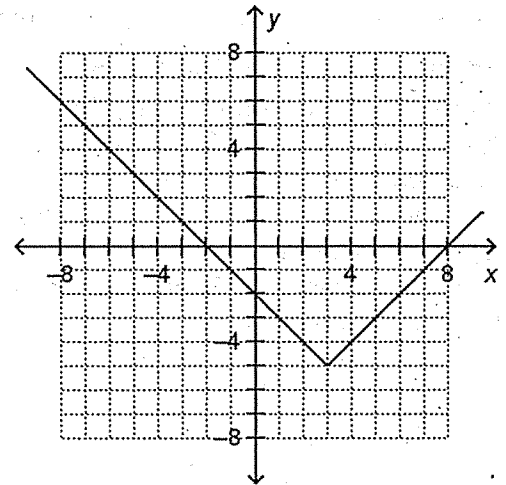
- (A) An absolute value function  
 (B) A cube root function  
 (C) A square root function  
 (D) A step function

2. What are the x- and y-intercept(s) of  $f(x)$ ?



- (A) x-intercept: 1  
 (B) y-intercept: -1  
 (C) x-intercept: -5; y-intercept: -1  
 (D) x-intercepts: -5, 1; y-intercept: -1

3. What is the vertex of  $f(x)$ ? Is it a maximum or a minimum?

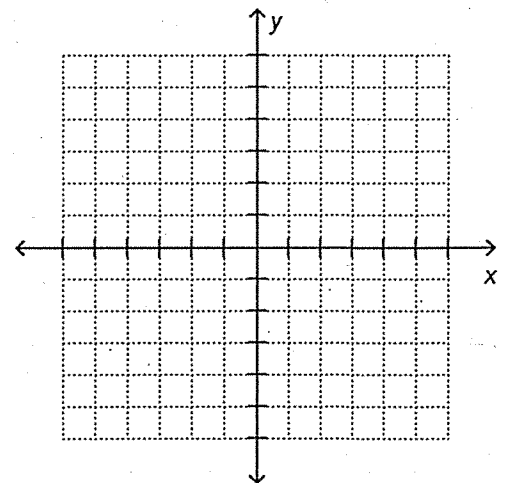


- (A) (0, -2); minimum  
 (B) (3, -5); minimum  
 (C) (-2, 0); minimum  
 (D) (8, 0); maximum

**CONSTRUCTED RESPONSE**

4. Graph the piecewise defined function. What are the domain and range?

$$f(x) = \begin{cases} -2 & x < -3 \\ 1 & -3 \leq x < 1 \\ 4 & x \geq 1 \end{cases}$$



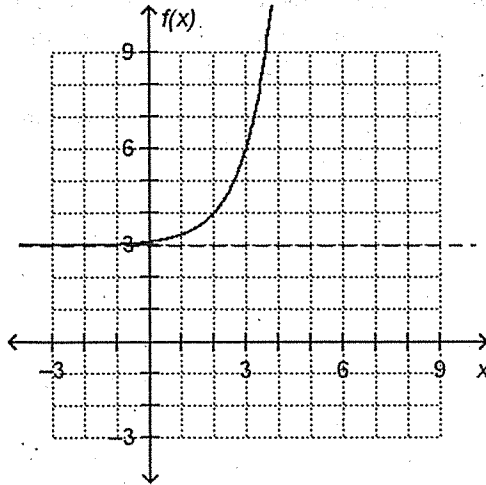




**F.IF.7e\*****SELECTED RESPONSE**

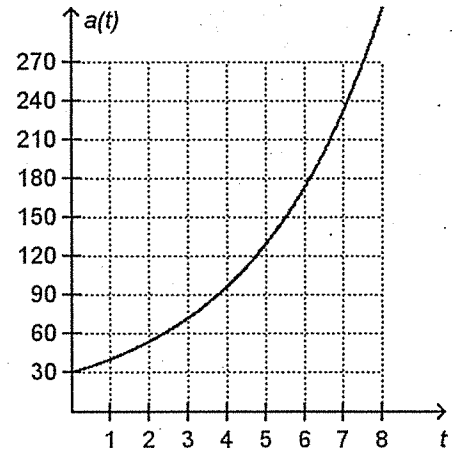
Select the correct answer.

1. The exponential function  $f(x)$  has a horizontal asymptote at  $y = 3$ . What is the end behavior of  $f(x)$ ?



- (A) As  $x$  decreases without bound,  $f(x)$  decreases without bound. As  $x$  increases without bound,  $f(x)$  increases without bound.
- (B) As  $x$  decreases without bound,  $f(x)$  increases without bound. As  $x$  increases without bound,  $f(x)$  decreases without bound.
- (C) As  $x$  decreases without bound,  $f(x)$  approaches, but never reaches, 3. As  $x$  increases without bound,  $f(x)$  increases without bound.
- (D) As  $x$  decreases without bound,  $f(x)$  decreases without bound. As  $x$  increases without bound,  $f(x)$  approaches, but never reaches, 4.

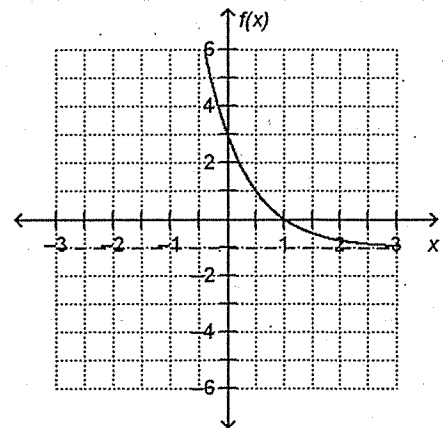
2. A website allows its users to submit and edit content in an online encyclopedia. The graph shows the number of articles  $a(t)$  in the encyclopedia  $t$  months after the website goes live. How many articles were in the encyclopedia when it went live?



- (A) 0                      (C) 60  
(B) 30                     (D) 180

Select all correct answers.

3. Which statements are true about the graph of the exponential function  $f(x)$ ?



- (A) The domain is all real numbers.  
(B) The range is all real numbers.  
(C) The  $f(x)$ -intercept is 3.  
(D) The  $x$ -intercept is  $-1$ .  
(E) As  $x$  increases without bound,  $f(x)$  approaches, but never reaches,  $-1$ .



### F.IF.8a

#### SELECTED RESPONSE

Select the correct answer.

1. What are the zeros of the function  $f(x) = x^2 + 2x - 8$ ?
  - (A)  $x = 4$  and  $x = -2$
  - (B)  $x = -4$  and  $x = 2$
  - (C)  $x = -4$  and  $x = -2$
  - (D)  $x = 4$  and  $x = 2$
  
2. What is the axis of symmetry of the graph of  $f(x) = 3x^2 - 6x + 6$ ?
  - (A)  $x = -1$
  - (B)  $x = 1$
  - (C)  $y = 1$
  - (D)  $y = 3$

Select all correct answers.

3. Which of the following statements correctly describe the graph of  $f(x) = 2x^2 + 8x - 2$ ?
  - (A) The maximum value of the function is 10.
  - (B) The minimum value of the function is  $-10$ .
  - (C) The axis of symmetry is the line  $x = -2$ .
  - (D) The axis of symmetry is the line  $x = 2$ .
  - (E) The graph is a parabola that opens up.
  - (F) The graph is a parabola that opens down.

Select the correct answer for each lettered part.

4. Consider the function  $f(x) = 2x^2 + 4x - 30$ . Classify each statement.
  - a. The vertex of the graph of  $f(x)$  is  $(1, -32)$ .       True     False
  - b. The zeros of  $f(x)$  are  $x = 3$  and  $x = -5$ .       True     False
  - c. The graph of  $f(x)$  opens down.       True     False
  - d. The axis of symmetry is  $x = -1$ .       True     False
  - e. The  $y$ -intercept of  $f(x)$  is  $-30$ .       True     False

#### CONSTRUCTED RESPONSE

5. Consider the function  $f(x) = 4x^2 + 4x - 15$ .
  - a. Factor the expression  $4x^2 + 4x - 15$ . What are the zeros of  $f(x)$ ?

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- b. What are the coordinates of the vertex of  $f(x)$ ? Is the vertex the maximum or minimum value of the function? Explain.

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## F.IF.8b

### SELECTED RESPONSE

Select the correct answer.

- The balance  $B$ , in dollars, after  $t$  years of an investment that earns interest compounded annually is given by the function  $B(t) = 1500(1.045)^t$ . To the nearest hundredth of a percent, what is the monthly interest rate for the investment?
 

(A) 0.37%                       (C) 4.50%  
 (B) 3.67%                       (D) 69.59%
- After  $t$  days, the mass  $m$ , in grams, of 100 grams of a certain radioactive element is given by the function  $m(t) = 100(0.97)^t$ . To the nearest percent, what is the weekly decay rate of the element?
 

(A) 3%                               (C) 21%  
 (B) 19%                             (D) 81%

Select all correct answers.

- Which of these functions describe exponential growth?
 

(A)  $f(t) = 1.25^t$   
 (B)  $f(t) = 2(0.93)^{0.5t}$   
 (C)  $f(t) = 3(1.07)^{3t}$   
 (D)  $f(t) = 18(0.85)^t$   
 (E)  $f(t) = 0.5(1.05)^t$   
 (F)  $f(t) = 3(1.71)^{5t}$   
 (G)  $f(t) = 0.68^{2t}$   
 (H)  $f(t) = 8(1.56)^{1.4t}$

Select the correct answer for each lettered part.

- Determine if each function below is equivalent to  $f(t) = 0.25^t$ .
 

a. $f(t) = 1^{\frac{t}{4}}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent
b. $f(t) = 0.5^{2t}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent
c. $f(t) = 0.0625^{\frac{t}{2}}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent
d. $f(t) = 0.125^{\frac{t}{2}}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent
e. $f(t) = 4^{-t}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent
f. $f(t) = -0.25^{-t}$	<input type="radio"/> Equivalent	<input type="radio"/> Not equivalent

### CONSTRUCTED RESPONSE

- The population  $P$ , in millions, of a certain country can be modeled by the function  $P(t) = 3.98(1.02)^t$ , where  $t$  is the number of years after 1990.
  - Write the equation in the form  $P(t) = a(1 + r)^t$ .

b. What is the value of  $r$  in your answer from part a? What does this value represent?

6. How do the function values of  $g(x) = 200(4^{x-1})$  compare to the corresponding function values of  $f(x) = 200(4^x)$ ? Explain using a transformation of  $g(x)$ .

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7. The value  $V$ , in dollars, after  $t$  years of an investment that earns interest compounded annually is given by the function  $V(t) = 1500(1.035)^t$ .

a. Rewrite  $V(t)$  to find the annual interest rate of the investment.

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b. Find the approximate interest rate over a 5-year period by rewriting the function using the power of a power property. Round to the nearest percent.

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8. Sanjay plans to deposit \$850 in a bank account whose balance  $B$ , in dollars, after  $t$  years is modeled by  $B(t) = 850(1.04)^t$ .

a. Write the equation in the form  $B(t) = a(1 + r)^t$ . What is the annual interest rate of Sanjay's account?

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b. Rewrite the equation from part a to approximate the monthly interest rate. Round to the nearest hundredth of a percent.

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c. Rebecca deposits \$850 in a bank account that earns 0.35% interest compounded monthly. Without calculating the account balances, which account will have a larger balance after 6 months? Explain.

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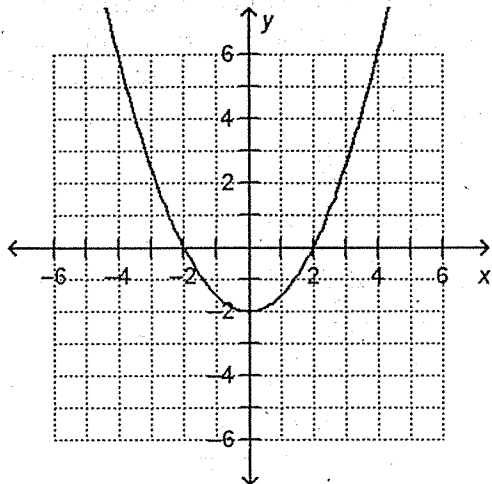
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### F.IF.9

#### SELECTED RESPONSE

Select the correct answer.

1. A quadratic function is shown below. Which function has the same domain?



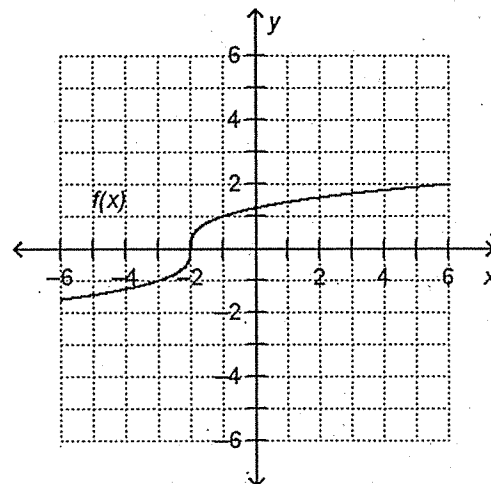
- (A)  $f(x) = \sqrt{x-2}$   
 (B)  $g(x) = \sqrt{x} - 2$   
 (C)  $h(x) = |x-2|$   
 (D)  $k(x) = 3^x, x \geq -2$
2. The function  $f(x)$  is defined for only the values given in the table. Which function has the same  $x$ -intercepts as  $f(x)$ ?

$x$	$f(x)$
-2	2.5
-1	0
0	-1.5
1	-2
2	-1.5
3	0
4	2.5

- (A)  $g(x) = 2x + 2$   
 (B)  $h(x) = -\frac{1}{3}x + 2$   
 (C)  $j(x) = x^2 + 2x - 3$   
 (D)  $k(x) = |x - 1| - 2$

Select all correct answers.

3. Which functions have the same range as the cube root function  $f(x)$  shown in the graph?



- (A)  $g(x) = \sqrt{x+2}$   
 (B)  $h(x) = \frac{1}{3}x + 1$   
 (C)  $j(x) = x^2 - 6x + 8$   
 (D)  $k(x) = -|2x| - 1$   
 (E)  $m(x) = \sqrt[3]{2x-1} + 2$

#### CONSTRUCTED RESPONSE

4. The function  $f(x)$  is defined for only the values in the table. Let  $g(x) = x^2 + 3$  for all real numbers  $1 \leq x \leq 4$ . Compare the domains, ranges, and initial values of the functions.

$x$	$f(x)$
1	4
2	6
3	10
4	18

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