

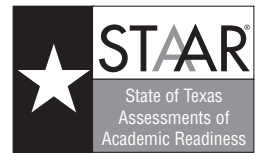
# **Algebra I Modified**

**Administered May 2014**

**RELEASED**



# STAAR ALGEBRA I REFERENCE MATERIALS



## GENERAL FORMULAS

Slope of a line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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Pythagorean theorem

$$a^2 + b^2 = c^2$$

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Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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## FORMS OF LINEAR EQUATIONS

Slope-intercept form

$$y = mx + b$$

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Point-slope form

$$y - y_1 = m(x - x_1)$$

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Standard form

$$Ax + By = C$$

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# STAAR ALGEBRA I REFERENCE MATERIALS

## CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$
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## AREA

Triangle	$A = \frac{1}{2}bh$
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Rectangle or parallelogram	$A = bh$
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Rhombus	$A = \frac{1}{2}d_1d_2$
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Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$
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Regular polygon	$A = \frac{1}{2}aP$
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Circle	$A = \pi r^2$
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## SURFACE AREA

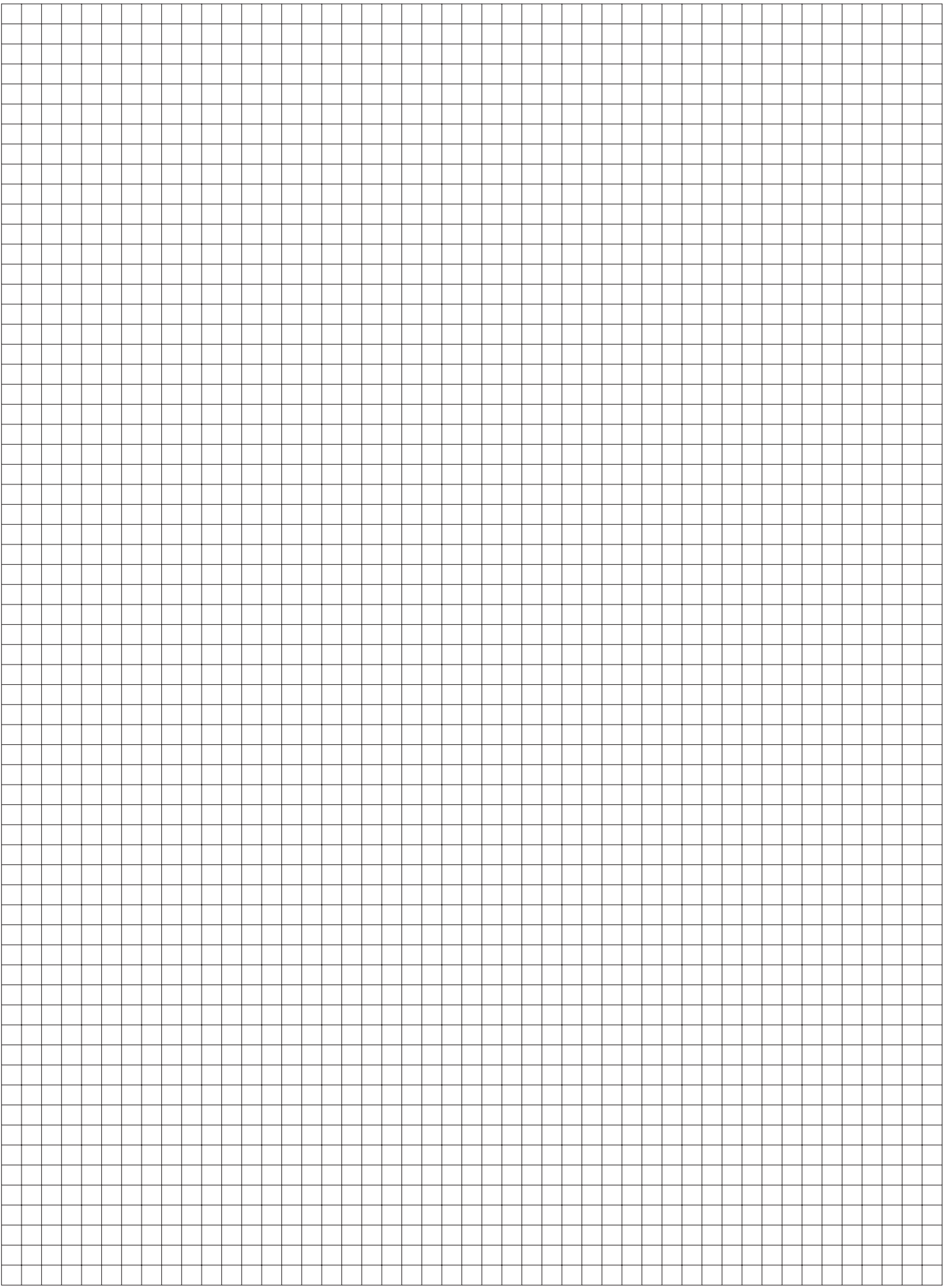
	Lateral	Total
Prism	$S = Ph$	$S = Ph + 2B$
Pyramid	$S = \frac{1}{2}Pl$	$S = \frac{1}{2}Pl + B$
Cylinder	$S = 2\pi rh$	$S = 2\pi rh + 2\pi r^2$
Cone	$S = \pi rl$	$S = \pi rl + \pi r^2$
Sphere		$S = 4\pi r^2$

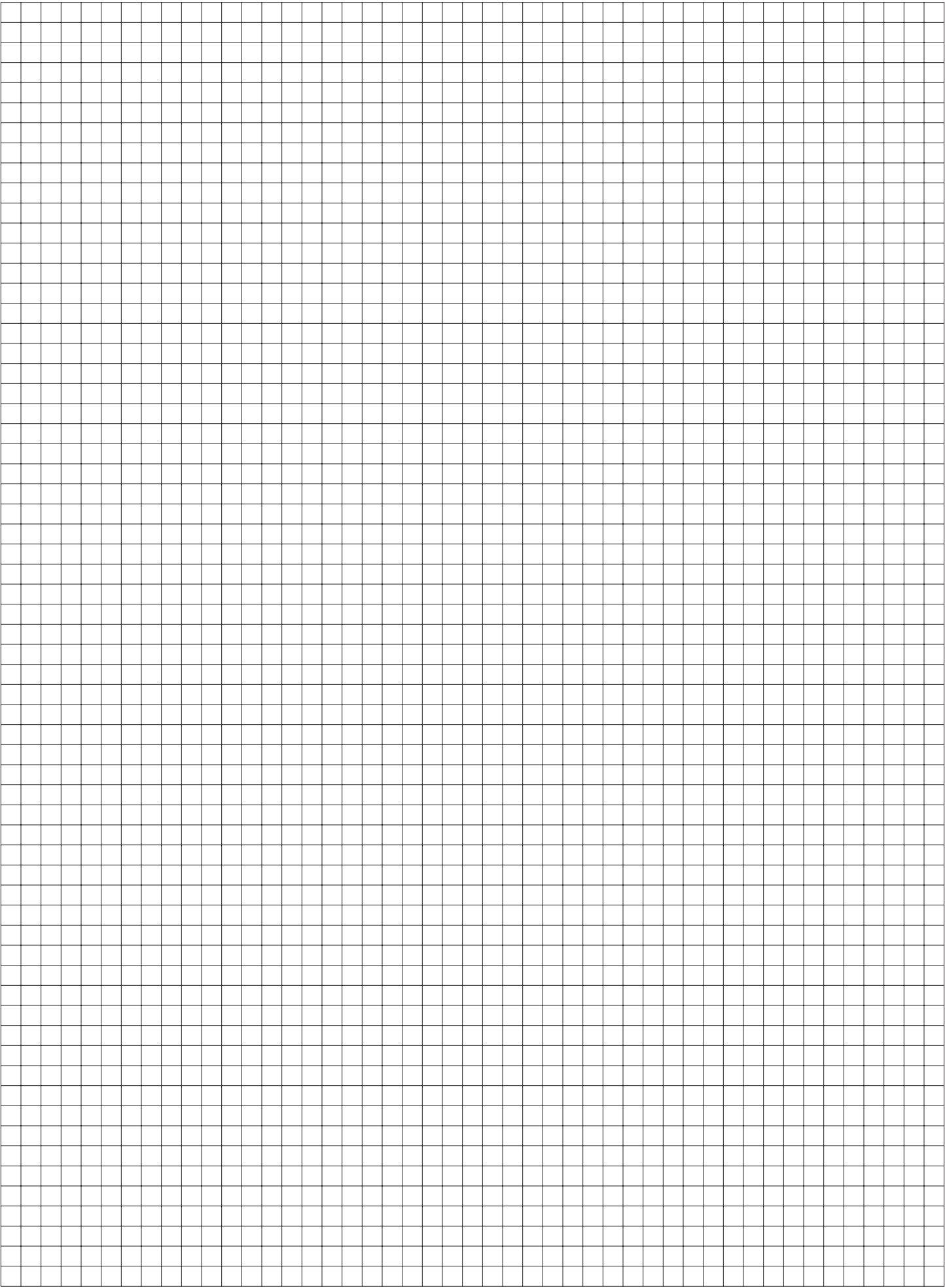
## VOLUME

Prism or cylinder	$V = Bh$
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Pyramid or cone	$V = \frac{1}{3}Bh$
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Sphere	$V = \frac{4}{3}\pi r^3$
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# ALGEBRA I

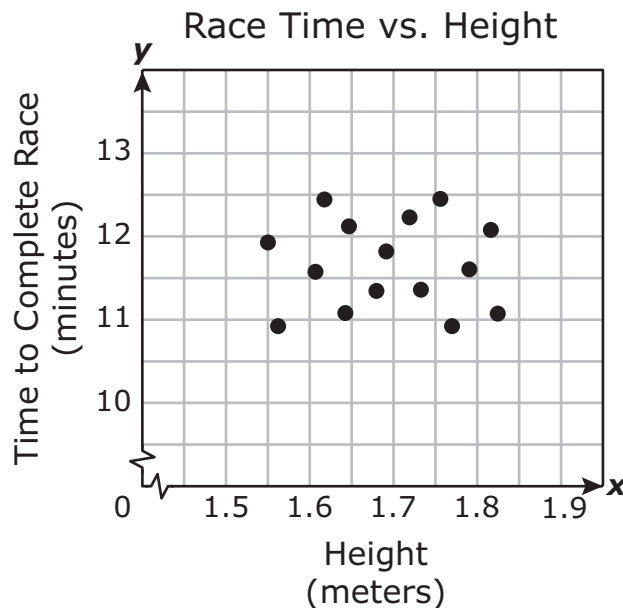




## DIRECTIONS

Read each question. For a multiple-choice question, choose the best answer from the three choices provided and fill it in on your answer document. For a griddable question, fill in your answer in the grid on the answer document.

- 1 A group of 15 runners competed in a race. The scatterplot shows each runner's height and the time it took each runner to finish the race.



Based on the scatterplot, which statement is true?

- A** Shorter runners always finished the race in less time than taller runners.
- B** Taller runners always finished the race in less time than shorter runners.
- C** No relationship can be determined between runner height and race time.

- 2 The table below shows a functional relationship between  $x$  and  $f(x)$ .

$x$	-2	-1	0	1
$f(x)$	9	6	5	6

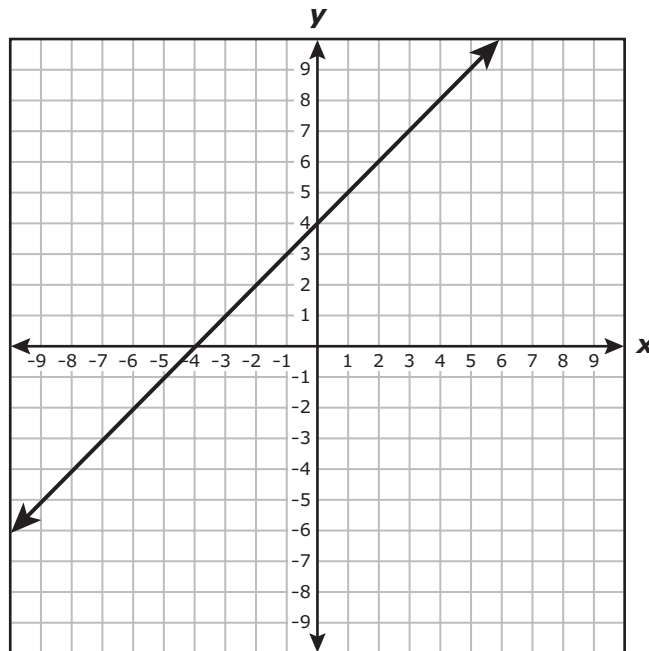
Which function represents this relationship?

**F**  $f(x) = x^2 + 5$

**G**  $f(x) = -3x + 3$

**H**  $f(x) = -x^2 + 5$

- 3** The line represented by  $y = x + 4$  is graphed below.



If the line's  $y$ -intercept is changed to 6 and its slope remains the same, which statement is true?

- A** The new line will have a  $y$ -intercept 2 units above the  $y$ -intercept of the original line.
- B** The new line will have a  $y$ -intercept 2 units below the  $y$ -intercept of the original line.
- C** The new line will be steeper than the original line.

**4** A radio station is having a contest.

- The prize is \$50,000.
- If more than one person wins the contest, the prize will be shared equally by all the winners.

Which function represents this situation in terms of  $p$ , the prize money each winner will receive, and  $n$ , the number of winners?

**F**  $p = 50,000n$

**G**  $p = \frac{n}{50,000}$

**H**  $p = \frac{50,000}{n}$

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**5** Which expression is equivalent to  $6(2x + y) + x - 7y$ ?

**A**  $13x + 13y$

**B**  $13x - y$

**C**  $13x - 6y$

- 6** A student filled the gas tank in his car before going on a trip.
- During the trip, to find out how many gallons of gas are left in the tank, he can use the function  $g = 15 - 3h$ .
  - $g$  represents how many gallons of gas are left in the tank.
  - $h$  represents the number of hours his car has been driven.

Based on this information, which statement is true?

- F** After the car is driven 3 hours, there are 6 gallons of gas left in the tank.
- G** After the car is driven 45 hours, there are 20 gallons of gas left in the tank.
- H** After the car is driven 2 hours, there are 21 gallons of gas left in the tank.

**7** A grocery store sells apples and pears.

- Apples cost \$2.49 a pound.
- Pears cost \$1.79 a pound.

Which inequality represents the number of pounds of apples,  $a$ , and the number of pounds of pears,  $p$ , that can be purchased for less than \$10?

- A**  $2.49a + 1.79p > 10$
- B**  $2.49a + 1.79p < 10$
- C**  $(2.49 + a) + (1.79 + p) < 10$

- 8 Which table represents the graph of a linear function that has a slope of  $\frac{1}{3}$ ?

Slope of a line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

**F**

$x$	$f(x)$
-1	-5
0	-2
1	1
2	4

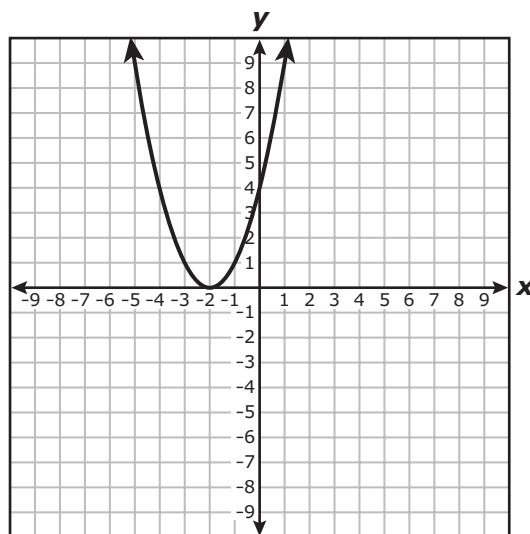
**H**

$x$	$f(x)$
-6	-2
-3	-1
0	0
3	1

**G**

$x$	$f(x)$
-3	-1
0	-2
3	-3
6	-4

- 9 The graph of a quadratic function is shown below.



What is the value or values of  $x$  when  $y = 0$ ?

- A  $x = -2$
- B  $x = -2$  and  $x = 2$
- C  $x = -2$  and  $x = 4$



- 10** The table below shows  $T$ , the temperature of a liquid, in degrees Fahrenheit, after it is placed on a heat source for  $s$  seconds.

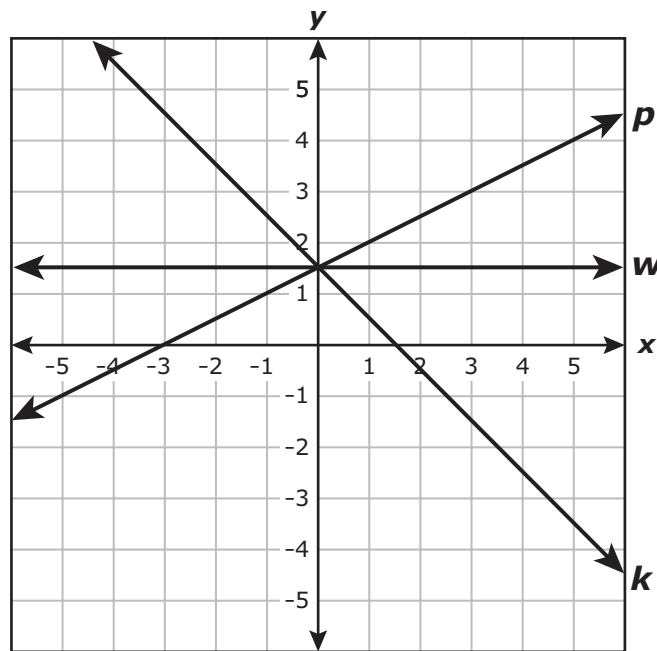
Temperature of a Liquid

$s$ (seconds)	$T$ (°F)
5	80
10	86
15	92
20	98

If the trend in the table continues, what will be the temperature of this liquid in degrees Fahrenheit after it has been on the heat source for 30 seconds?

Record your answer and fill in the bubbles on your answer document.

**11** Which of the lines graphed below best represents the function  $y = \frac{3}{2}$ ?



- A** Line  $p$
- B** Line  $w$
- C** Line  $k$

**12** A machine produces ice at a constant rate of 3 pounds per hour. Which function can be used to determine  $y$ , the number of pounds of ice that this machine produces in  $x$  hours?

**F**  $y = x + 3$

**G**  $y = 3x$

**H**  $y = 3x + 1$

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**13** A company makes T-shirts and sells them for \$12 each.

- Last year the materials used to make the T-shirts cost \$140.
- The profit made last year,  $y_1$ , can be found using the function  $y_1 = 12x - 140$ .
- The profit made this year,  $y_2$ , can be found using the function  $y_2 = 12x - 100$ .
- The company sold the same number of T-shirts,  $x$ , this year as it sold last year.

How did the profit change from last year to this year?

- A** The profit increased by \$40.
- B** The profit decreased by \$40.
- C** The profit increased by \$40 per T-shirt.

**14** Which statement describes the quadratic equation shown below?

$$x^2 + 9 = 0$$

- F** The equation has  $x = 3$  and  $x = -3$  as its only solutions.
- G** The equation has no real solutions.
- H** The equation has an infinite number of solutions.

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**15** What is the range of the function  $f = \{(0, 5), (1, 6), (2, 7)\}$ ?

- A**  $\{0, 1, 2, 5, 6, 7\}$
- B**  $\{0, 1, 2\}$
- C**  $\{5, 6, 7\}$

**16** A bakery sells brownies and cookies.

- One brownie and one cookie cost a total of 85 cents.
- One brownie costs 15 cents more than one cookie.

How much does one cookie cost?

**F** 35 cents

**G** 50 cents

**H** 70 cents

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**17** Which statement is true for the graphs of the linear functions below?

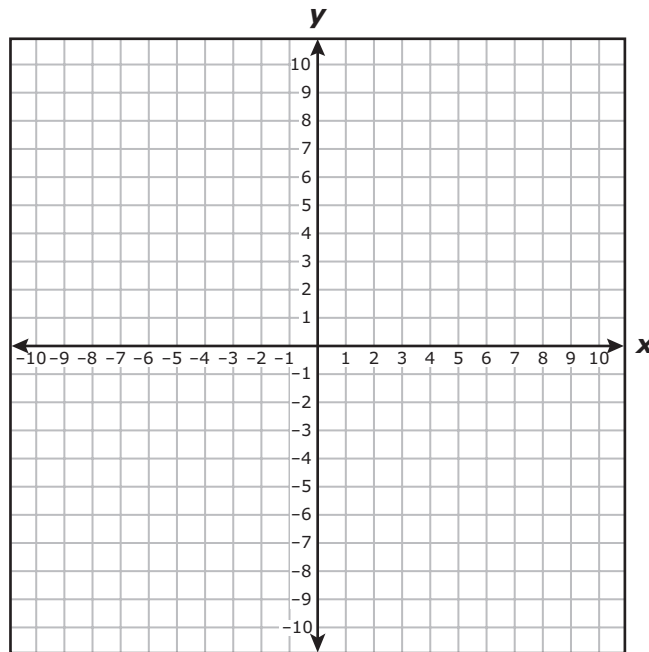
$$y = 3x - 7$$

$$y = -3x - 7$$

- A** The graphs of the functions are lines with the same slope.
- B** The graphs of the functions are the same line.
- C** The graphs of the functions are lines with the same  $y$ -intercept.

**18** The table below represents  $y$  as a function of  $x$ .

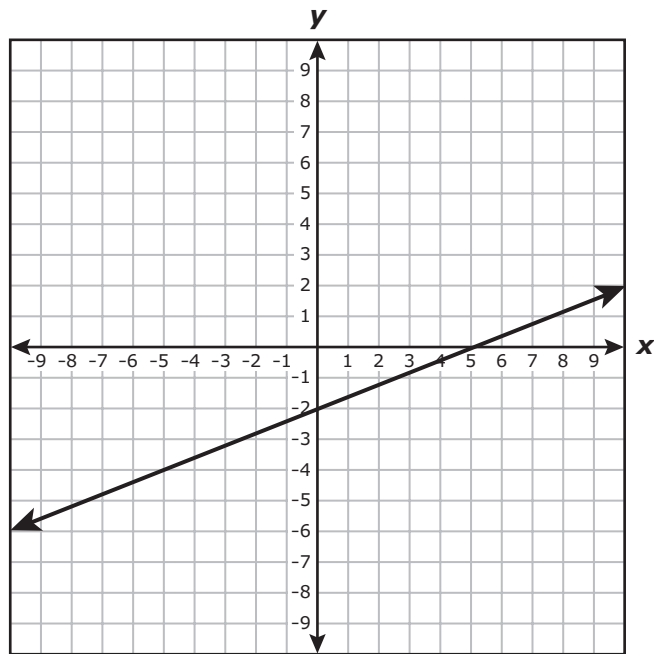
$x$	$y$
1	8
2	6
4	2
5	0



Which statement describes the data in this table?

- F** There is a positive correlation between  $x$  and  $y$ .
- G** There is a negative correlation between  $x$  and  $y$ .
- H** There is no correlation between  $x$  and  $y$ .

**19** Which function describes the graph shown below?



**A**  $y = -\frac{2}{5}x + 2$

**B**  $y = -\frac{2}{5}x - 2$

**C**  $y = \frac{2}{5}x - 2$

**20** What are the coordinates of the point where the graph of  $3x - 7y = 21$  crosses the  $x$ -axis?

**F**  $(7, 0)$

**G**  $(0, -3)$

**H**  $(-7, 0)$

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**21** A small business owns a car and a truck.

- The car was driven for 2,112 miles in one month.
- The truck can travel 25 miles per gallon of gasoline.
- $x$  represents the number of gallons of gasoline used by the truck in the same month.

Which expression can be used to find the total number of miles the car and truck were driven in that month?

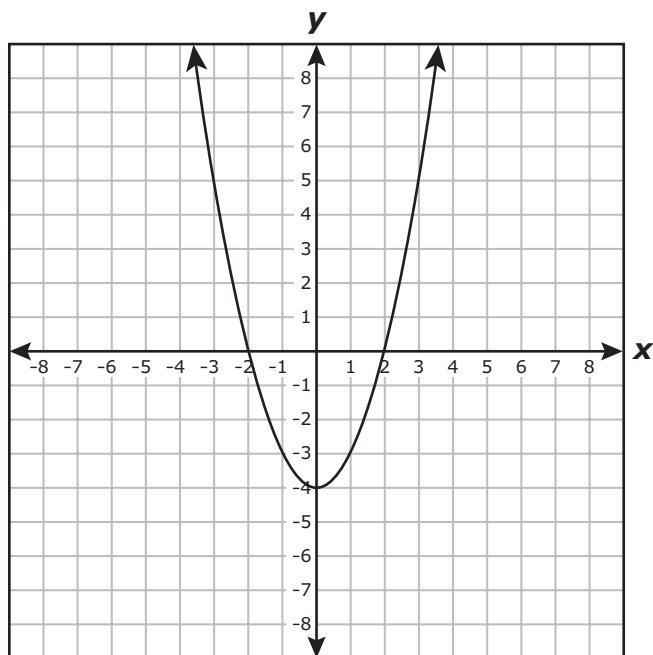
**A**  $\frac{2,112 + x}{25}$

**B**  $2,112 + 25x$

**C**  $2,112 + x$



**22** The graph of  $y = x^2 - 4$  is shown below.



Which point represents the vertex of the parabola?

**F**  $(-2, 0)$

**G**  $(1, -3)$

**H**  $(0, -4)$

**23** Every day an athlete runs  $m$  laps in the morning and  $e$  laps in the evening.

- She runs a total of 15 laps every day.
- In the morning she runs  $m$  laps at a rate of 2 minutes per lap.
- In the evening she runs  $e$  laps at a rate of 1.5 minutes per lap.
- She runs a total of 27 minutes every day.

Which system of equations can be used to find the number of laps she runs in the morning and the evening?

**A**  $m + e = 27$   
 $2m + 1.5e = 15$

**B**  $m + e = 15$   
 $2m + 1.5e = 27$

**C**  $m + e = 15$   
 $\frac{m}{2} + \frac{e}{1.5} = 27$

**24** A calculator displays the graph of the quadratic function  $y = ax^2$  for any value of  $a$ . If the value of  $a$  changes from 4 to 8, what will be the effect on the graph displayed?

- F** The graph will become wider.
- G** The graph will become narrower.
- H** The graph will shift upward.

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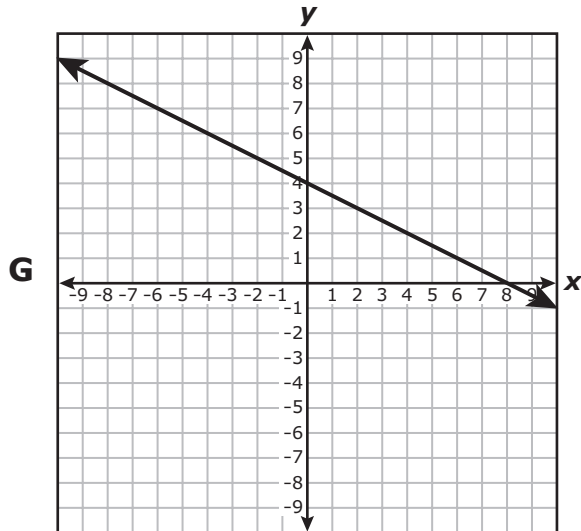
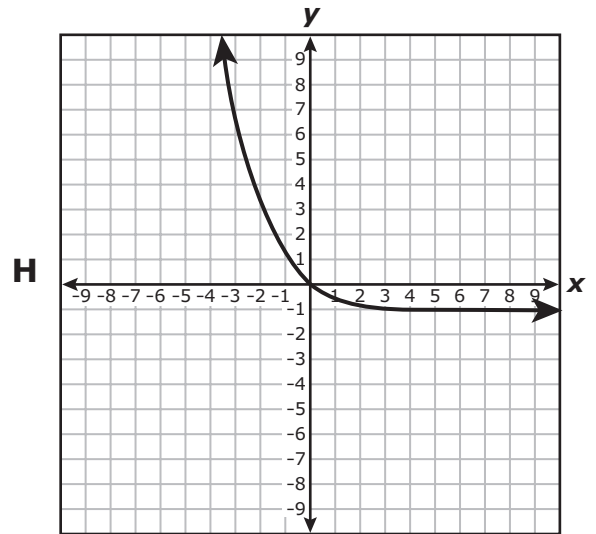
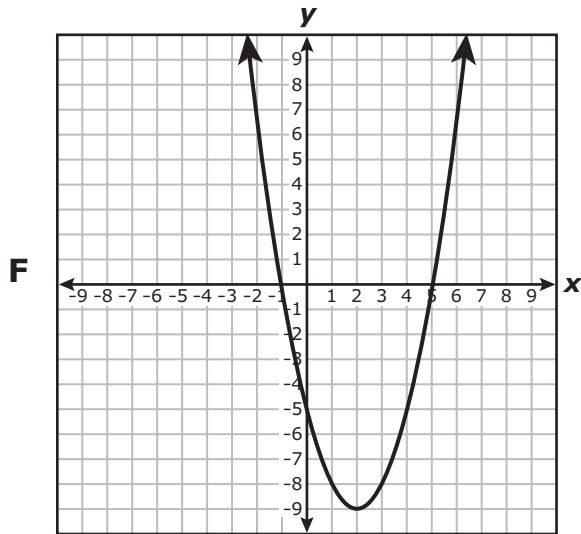
**25** The menu at a restaurant lists the prices of a meal with side dishes, as shown below. Each side dish is the same price.

Meal with:	
1 side dish	\$7.00
2 side dishes	\$9.00
3 side dishes	\$11.00

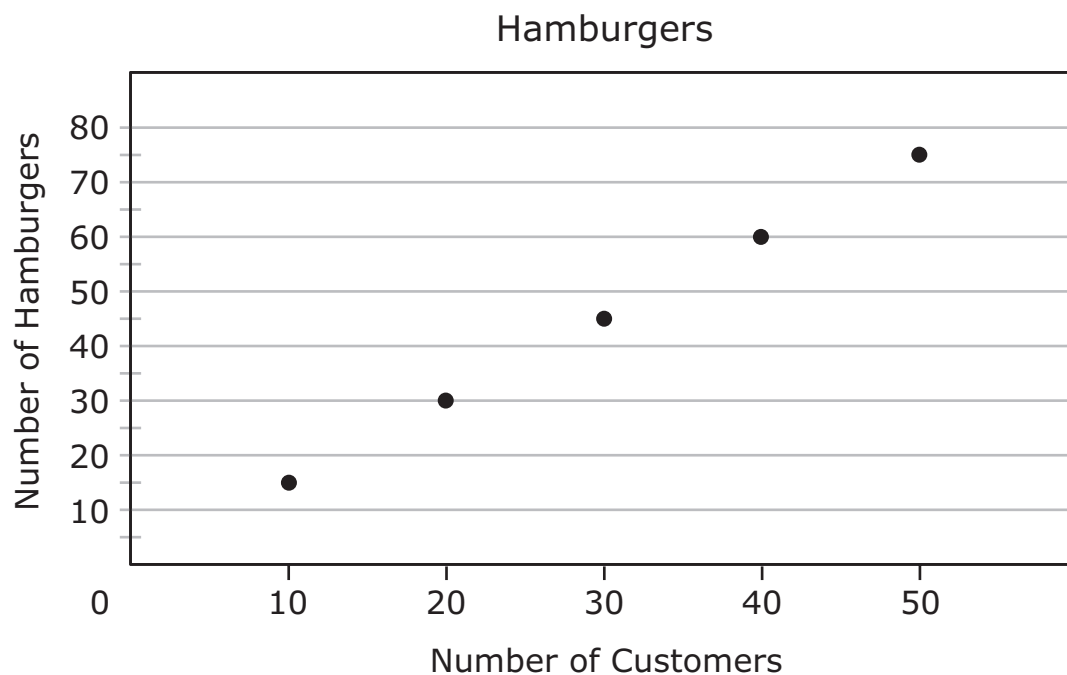
Based on this information from the menu, which statement is true?

- A** The price of a meal without a side dish is \$5.00.
- B** The price of a meal without a side dish is \$2.00.
- C** The price of a meal without a side dish is \$4.00.

**26** Which graph has  $y = x$  as its parent function?



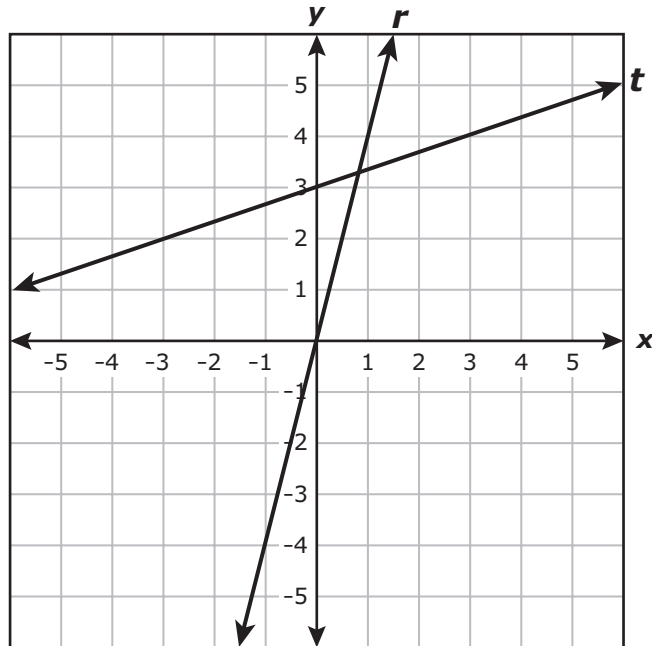
- 27** The relationship between the number of customers and the number of hamburgers they ordered at a restaurant is shown below.



If this trend continues, how many hamburgers will be ordered by 60 customers?

- A** 105
- B** 75
- C** 90

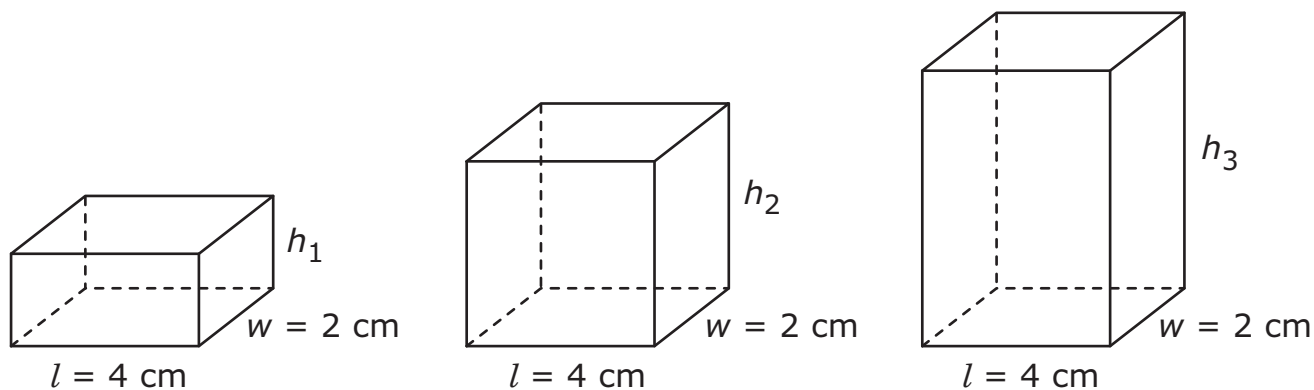
**28** The graphs of line  $r$  and line  $t$  are shown below.



Which statement is true?

- F** The slope of line  $r$  is equal to the slope of line  $t$ .
- G** The slope of line  $r$  is greater than the slope of line  $t$ .
- H** The slope of line  $r$  is less than the slope of line  $t$ .

- 29** The diagram below shows how the size of a box changes as only one of its dimensions,  $h$ , changes. The volume,  $V$ , of a box is given by the function  $V = lwh$ , where  $l$  represents the length,  $w$  represents the width, and  $h$  represents the height of the box.



What is the independent quantity in this function?

- A** The height,  $h$
- B** The volume,  $V$
- C** The width,  $w$

**30** A person plans to enter a state park and rent a bike.

- The park charges a \$10.00 entry fee.
- The park charges \$5.50 an hour to rent a bike.
- The person has only \$50.00 to spend.

What is the maximum number of hours this person can rent a bike after paying the entry fee?

- F** 8 hours
- G** 7 hours
- H** 11 hours



- 31** The graph of a line has a slope of  $-4$  and contains the point  $(2, 6)$ . Which equation represents this line?

Point-slope form  
 $y - y_1 = m(x - x_1)$

- A**  $y = 4x + 14$   
**B**  $y = -4x - 2$   
**C**  $y = -4x + 14$
- 

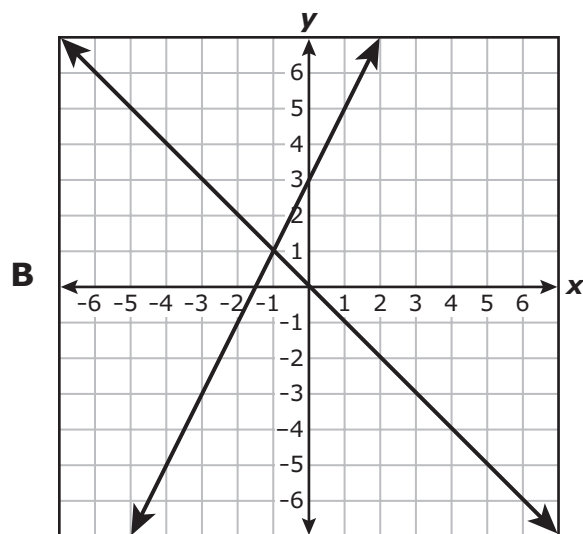
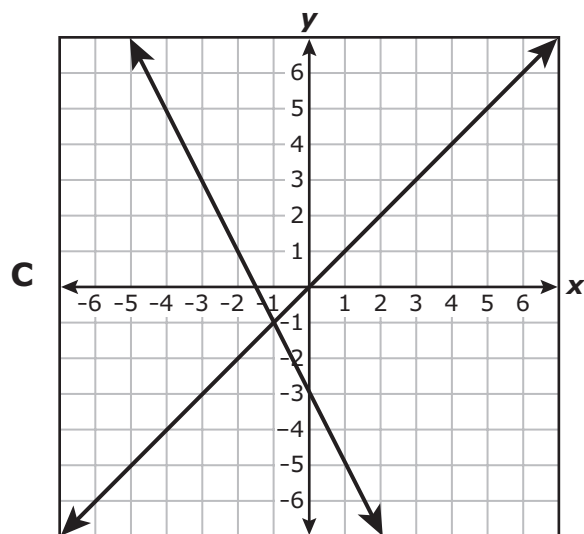
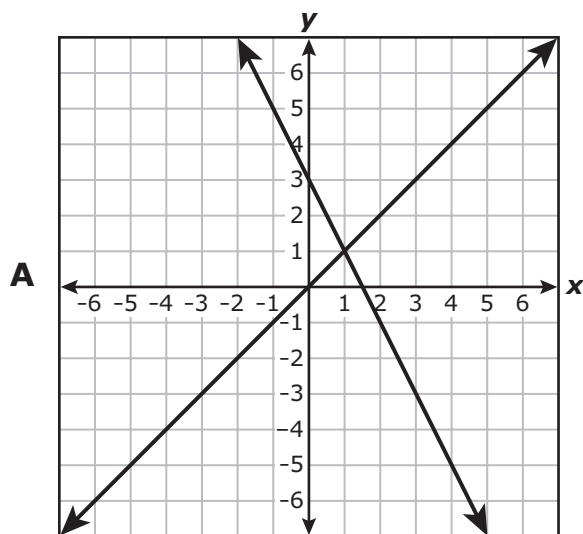
- 32** Which expression is equivalent to  $x^2 - 5x + 6$ ?

- F**  $(x + 2)(x + 3)$   
**G**  $(x - 2)(x - 3)$   
**H**  $(x - 6)(x + 1)$

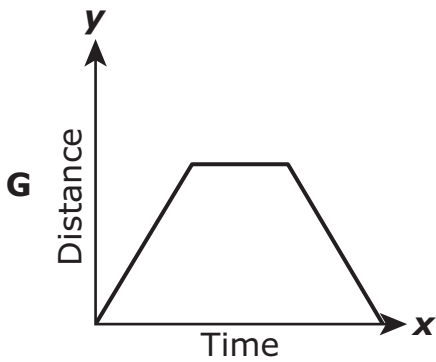
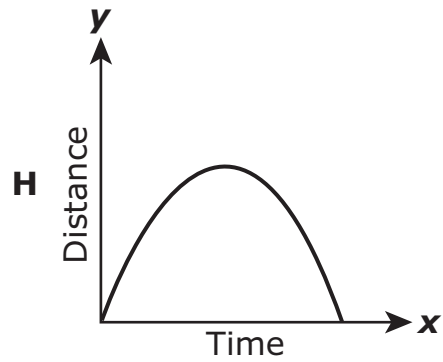
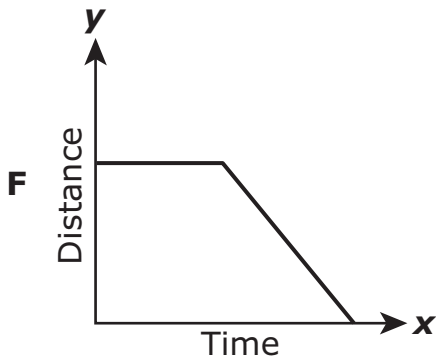
**33** Which graph can be used to find the solution to the system of equations below?

$$y = x$$

$$y = -2x + 3$$



- 34** A car travels away from its starting point at a constant speed. It stops for a brief period. The car then travels back toward its starting point at the same constant speed. Which graph represents the relationship between the elapsed time and the car's distance from its starting point?



**35** An online music store sells songs.

- The store charges the same amount for each song.
- The store adds a processing fee to each order.
- The function  $y = 0.60x + 1.00$  can be used to determine the total cost,  $y$ , of an order of  $x$  songs.

What does the slope of the graph of this function represent?

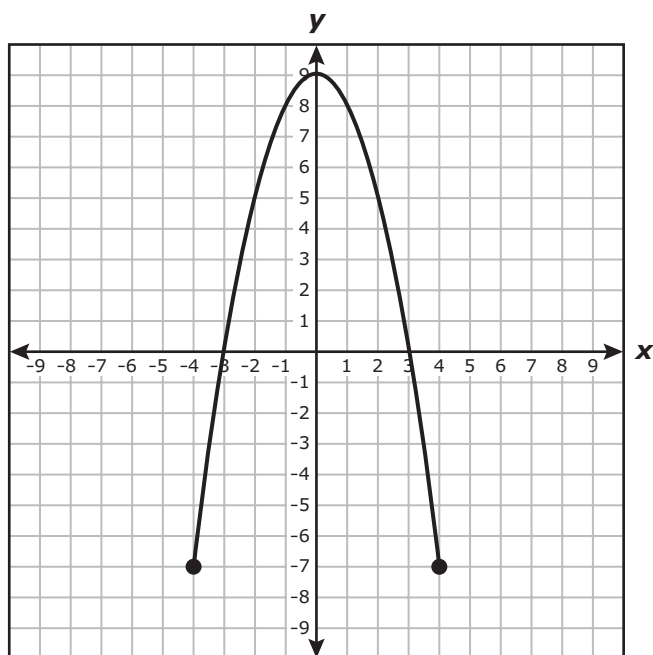
- A** The number of songs in an order
- B** The total cost of an order
- C** The cost of each song in an order

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**36** What are the solutions to  $2x^2 - x - 3 = 0$ ?

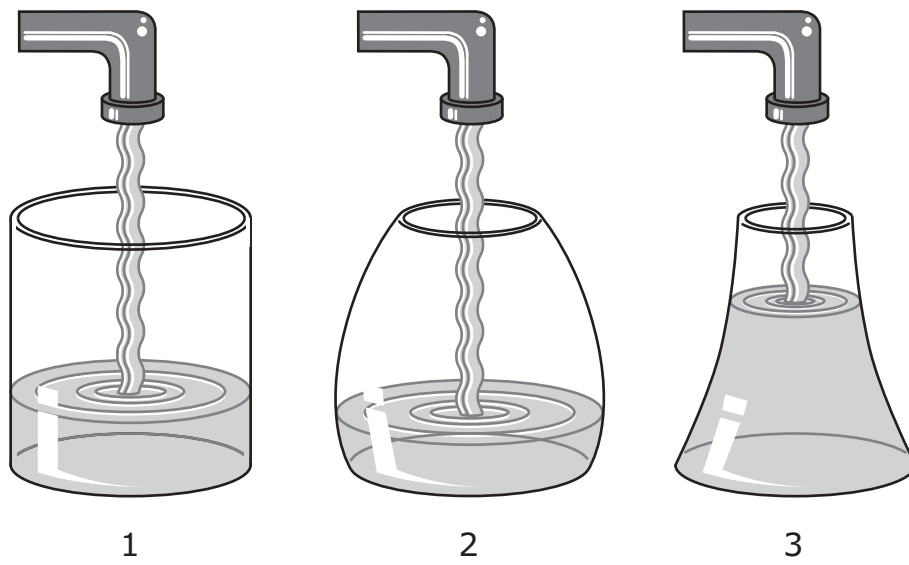
- F**  $x = -1$  and  $x = 1.5$
- G**  $x = -1$  and  $x = -1.5$
- H**  $x = 0.5$  and  $x = 3$

- 37** Which inequality describes the domain of the function represented by the graph below?



- A**  $-7 \leq y \leq 9$   
**B**  $-4 \leq x \leq 4$   
**C**  $x \leq 9$

- 38** Water is flowing into three containers at a constant rate of 15 cubic centimeters per second.

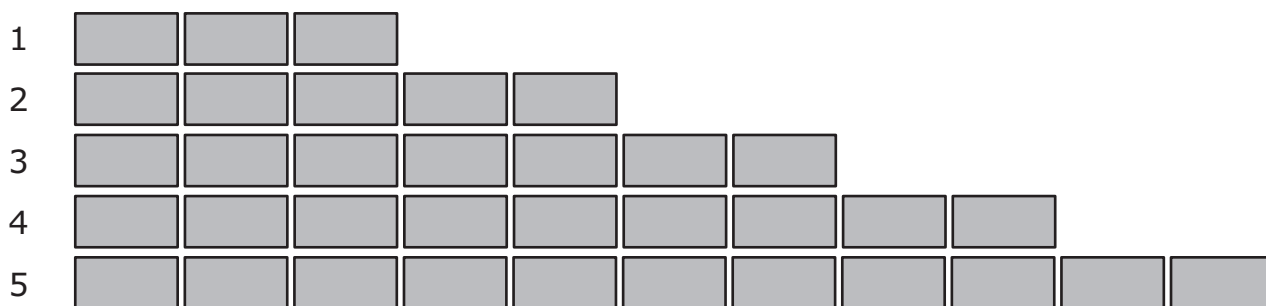


In which container can the changing height of the water be described as a linear function of time?

- F** Container 1
- G** Container 2
- H** Container 3

**39** The diagram below shows a wall made of layers of brick.

Layer,  $n$



Which function can be used to find  $b$ , the number of bricks in layer  $n$ ?

- A**  $b = n + 2$
- B**  $b = 2n + 1$
- C**  $b = 3n - 1$

- 40** A bird feeder contains 3 pounds of birdseed. Birds are eating the birdseed at the rate of 0.2 pound per day. The function below can be used to find  $p$ , the number of pounds of birdseed remaining in the bird feeder after  $d$  days.

$$p = 3 - 0.2d$$

If the birds continue to eat at the same rate, after how many days will the bird feeder be empty?

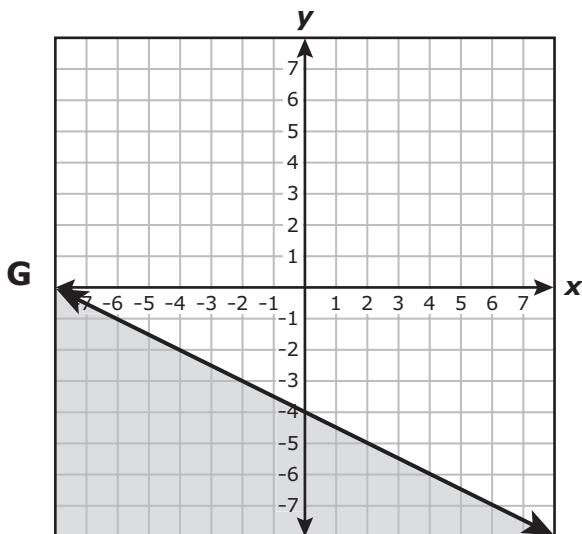
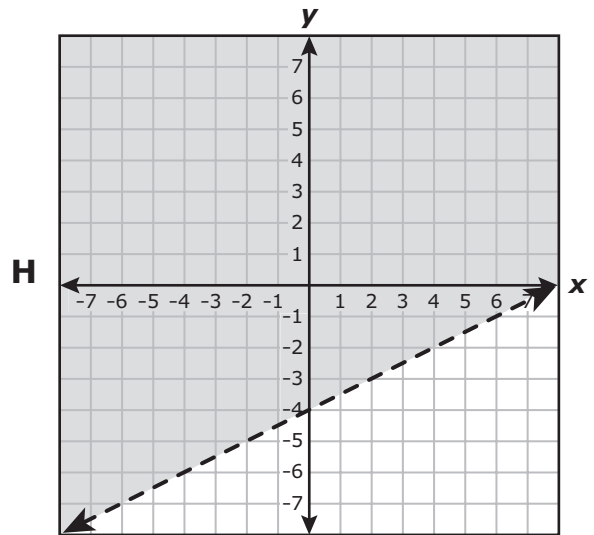
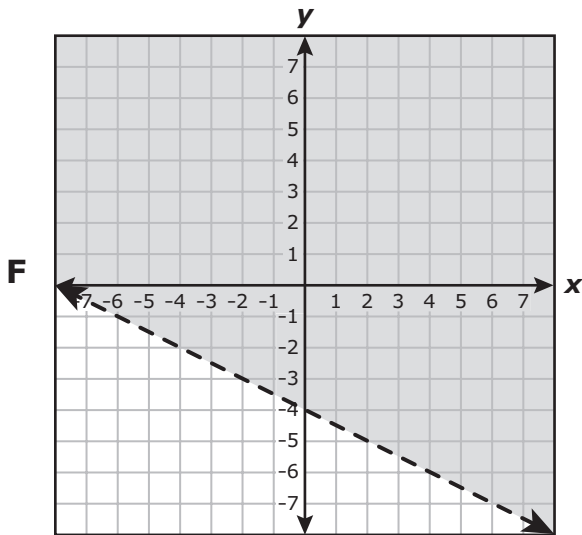
- F** 2.8 days
- G** 6 days
- H** 15 days

- 
- 41** Which function has a graph that opens upward and has a vertex at  $(2, 1)$ ?

- A**  $y = -x^2 + 4x - 3$
- B**  $y = x^2 - 2x + 3$
- C**  $y = x^2 - 4x + 5$



**42** Which graph represents the inequality  $y > -\frac{1}{2}x - 4$ ?



**43** A system of linear equations is represented by the two tables below.

Table 1

$x$	$y$
0	-2
1	0
2	2
3	4

Table 2

$x$	$y$
0	7
1	6
2	5
3	4

What is the solution to this system of equations?

**A** (0, 7)

**B** (1, 0)

**C** (3, 4)





**STAAR MODIFIED**  
**Algebra I**  
**May 2014**