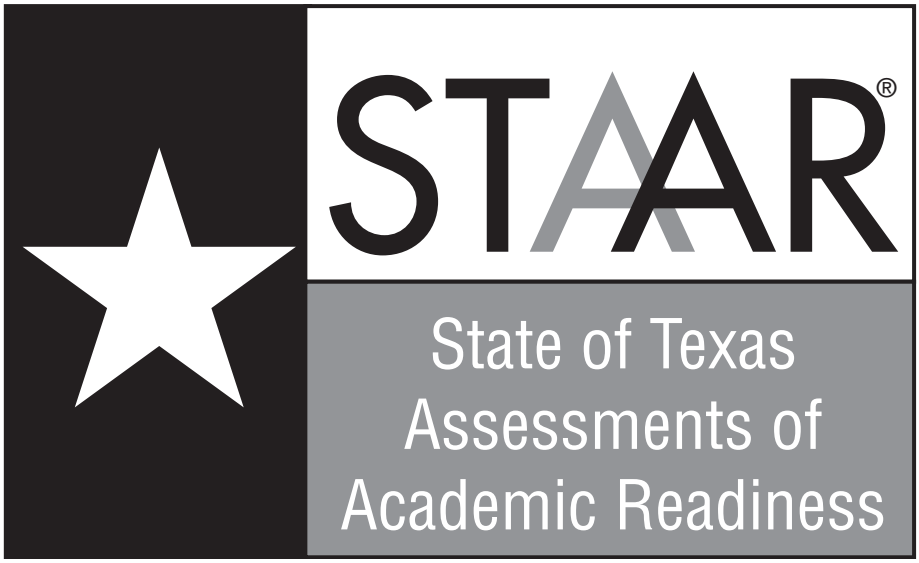



# Algebra I

## Administered May 2015

# RELEASED

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# STAAR ALGEBRA I REFERENCE MATERIALS

## GENERAL FORMULAS

| | |
|---|---|
| Slope of a line | $m = \frac{y_2 - y_1}{x_2 - x_1}$ |
| Pythagorean theorem | $a^2 + b^2 = c^2$ |
| Quadratic formula | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ |

## FORMS OF LINEAR EQUATIONS

| | |
|---|---|
| Slope-intercept form | $y = mx + b$ |
| Point-slope form | $y - y_1 = m(x - x_1)$ |
| Standard form | $Ax + By = C$ |

# STAAR ALGEBRA I REFERENCE MATERIALS

## CIRCUMFERENCE

| | | | |
|---|---|---|---|
| Circle | $C = 2\pi r$ | or | $C = \pi d$ |

## AREA

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

## 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 | | $S = 4\pi r^2$ |

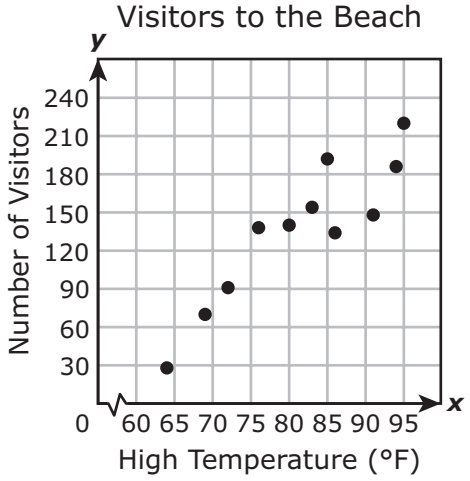
## VOLUME

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

# Algebra I

**DIRECTIONS**
**Read each question carefully. For a multiple-choice question, determine the best answer to the question from the four answer choices provided. For a griddable question, determine the best answer to the question. Then fill in the answer on your answer document.**

**1** The scatterplot shows the number of visitors to a beach each day and the high temperature in degrees Fahrenheit for that day.




Based on this scatterplot, which statement appears to be true?

**A** There is a nonlinear correlation between the high temperature and the number of visitors to the beach.

**B** When the high temperature is above 100°F, fewer than 150 visitors are expected at the beach.

**C** There is no correlation between the high temperature and the number of visitors to the beach.

**D** When the high temperature is between 75°F and 90°F, more than 120 visitors are expected at the beach.



GO ON

**2** A man bought $x$ boxes of doughnuts for \$3.49 each. He paid with a \$50 bill and received the correct amount of change. If he received more than \$10 but less than \$20, which inequality represents the number of boxes of doughnuts he could have bought?

**F** $9 \leq x \leq 11$

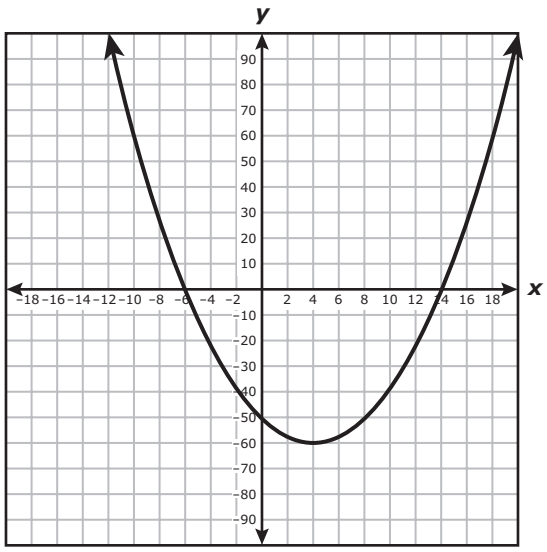
**G** $8 \leq x \leq 12$

**H** $8 \leq x \leq 11$

**J** $9 \leq x \leq 12$

---

**3** The graph of quadratic function $r$ is shown on the grid.




What is a solution to $r(x) = 0$?

**A** $-50$

**B** 4

**C** 14

**D** $-60$



GO ON

**4** The function $y = 6 + 1.25x$ can be used to find the cost of joining an online music club and buying $x$ songs from the website. Based on this information, which statement about the graph of this situation is true?

**F** The $y$-intercept of the graph represents the cost of each song.

**G** The $y$-intercept of the graph represents the cost of joining the music club.

**H** The slope of the graph represents the total number of songs bought by members of the club.

**J** The slope of the graph represents the number of songs each member buys when visiting the website.

---

**5** The first five figures in a pattern are shown below. Each figure is made up of identical circles.

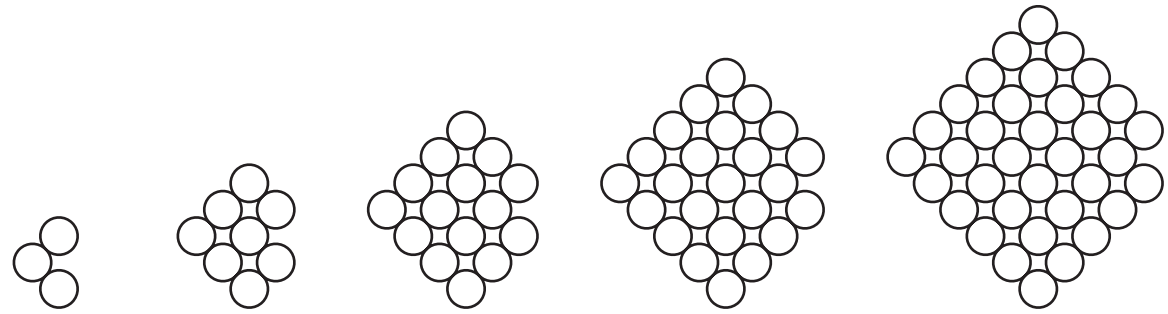


Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

If the pattern continues, which expression can be used to find the number of circles that make up Figure $n$?

**A** $n^2 + 2n$

**B** $n^2 + 2$

**C** $2n^2 + 1$

**D** $2n^2 + n$



GO ON

**6** One wall inside a shoe store is used to display walking shoes and running shoes. There are 135 pairs of shoes in this display. There are 1.5 times as many pairs of walking shoes as there are running shoes on display. How many pairs of walking shoes and running shoes are on display?

**F** 90 pairs of walking shoes and 45 pairs of running shoes

**G** 54 pairs of walking shoes and 81 pairs of running shoes

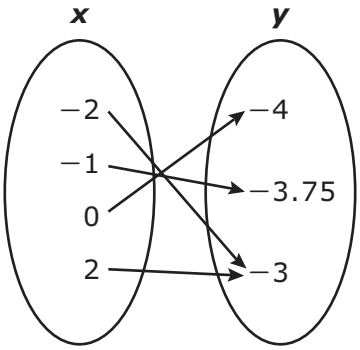
**H** 45 pairs of walking shoes and 90 pairs of running shoes

**J** 81 pairs of walking shoes and 54 pairs of running shoes



GO ON

**7** The mapping below represents $y$ as a quadratic function of $x$.

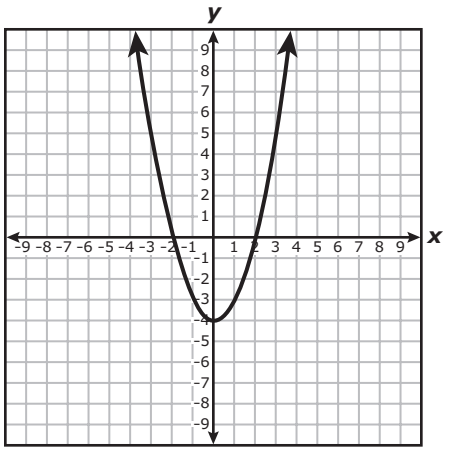



Which representation shows the same relationship between $x$ and $y$?

**A**

| $x$ | $y$ |
|---|---|
| −3 | 1.75 |
| 0 | −4 |
| 1 | 3.75 |
| 3 | 1.75 |

**B**




**C** {(−4, −6), (−2, −3), (0, −4), (1, −3.75)}

**D** $y = 0.25x^2 - 4$



GO ON

**8** The slope of the line that passes through the points $(-6, w)$ and $(-10, 4)$ is $\frac{1}{8}$. What is the value of $w$?

**F** 36

**G** 34

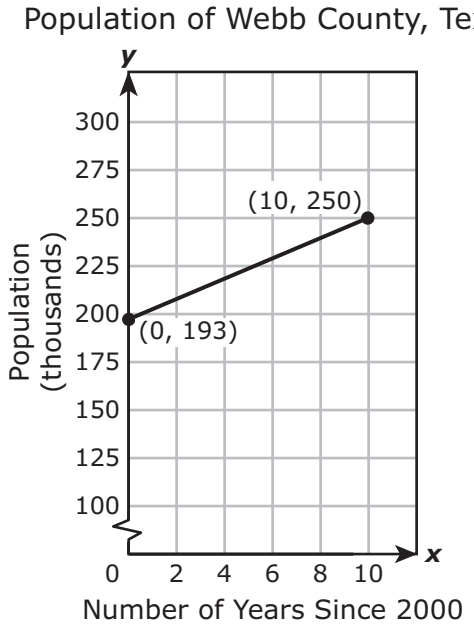
**H** $\frac{9}{2}$

**J** $\frac{1}{2}$



GO ON

**9** The population of Webb County, Texas, from the year 2000 through 2010 is shown in the graph.




If the trend shown in the graph continues, what will be the population of Webb County in 2015?

**A** 307,000

**B** 278,500

**C** 471,500

**D** 158,000



GO ON

**10** A city employee paints curbs in parking lots and replaces road signs. It takes 0.5 hour to paint a parking lot curb and 2.5 hours to replace a road sign. The function below can be used to find $c$, the number of parking lot curbs the employee paints when he replaces $r$ road signs in a 40-hour workweek.

$$c = \frac{40 - 2.5r}{0.5}$$

If the employee painted 20 curbs in one week, how many road signs did he replace that week?

**F** 20

**G** 30

**H** 0

**J** 12

---

**11** Customers at a bank are charged a fee when they exchange U.S. dollars for foreign currency. The function $f(x) = 78.5x - 392.5$ can be used to determine the number of Japanese yen a customer receives in exchange for $x$ dollars, where $x > 5$. Which table shows this relationship?

**A**

| U.S. Dollars Exchanged | Japanese Yen Received |
|---|---|
| 50 | 4,317.5 |
| 75 | 6,280 |
| 120 | 9,812.5 |
| 185 | 14,915 |

**B**

| U.S. Dollars Exchanged | Japanese Yen Received |
|---|---|
| 65 | 5,102.5 |
| 80 | 6,280 |
| 100 | 7,850 |
| 125 | 9,812.5 |

**C**

| U.S. Dollars Exchanged | Japanese Yen Received |
|---|---|
| 50 | 3,532.5 |
| 85 | 6,280 |
| 120 | 9,027.5 |
| 200 | 15,307.5 |

**D**

| U.S. Dollars Exchanged | Japanese Yen Received |
|---|---|
| 10 | 3,140 |
| 25 | 7,850 |
| 30 | 9,420 |
| 45 | 14,130 |



GO ON

**12** A rectangular prism has a width of $x$ inches, a length of $x^2y$ inches, and a height of $y^2$ inches. Which expression represents the volume in cubic inches of this rectangular prism?

**F** $4x^2y^2$

**G** $4x^3y^3$

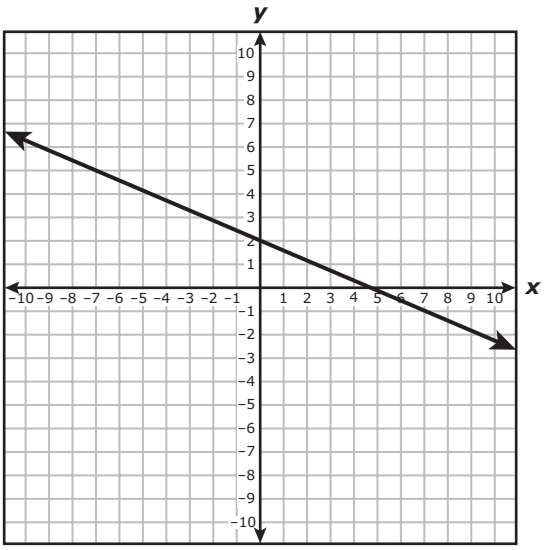
**H** $x^2y^2$

**J** $x^3y^3$



GO ON

**13** The graph of line *t* is shown on the grid.




Line *w* is steeper than line *t* and has a *y*-intercept that is below the *y*-intercept of line *t*. Which function could be represented by line *w*?

**A** $y = -\frac{2}{3}x - 1$

**B** $y = -\frac{3}{8}x + 4$

**C** $y = -\frac{4}{3}x + 4$

**D** $y = -\frac{1}{4}x - 1$

---

**14** A senior employee who works 16 hours earns $39.50 more than a junior employee who works 18 hours. The senior employee earns $14 per hour. What is the hourly pay in dollars and cents for the junior employee?

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



GO ON

**15** In three different workouts a runner burned 300 calories in 30 minutes, 350 calories in 35 minutes, and 200 calories in 20 minutes. Based on the data, which statement is true if the number of calories burned is a function of the number of minutes the runner worked out?

**A** The number of minutes the runner worked out is the dependent quantity.

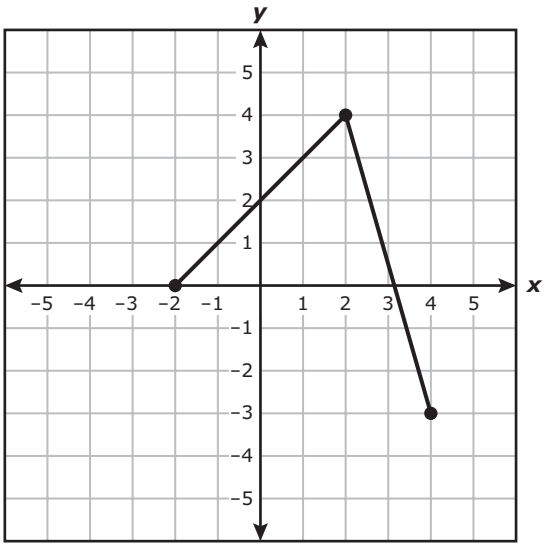
**B** The number of workouts the runner completed is the dependent quantity.

**C** The number of calories burned is the dependent quantity.

**D** The number of steps the runner takes is the dependent quantity.

---

**16** What is the range of the function graphed on the grid?




**F** $\{x \mid x = -2, 2, 4\}$

**G** $\{y \mid -3 \leq y \leq 4\}$

**H** $\{x \mid -2 \leq x \leq 4\}$

**J** $\{y \mid y = -3, 0, 4\}$



GO ON

**17** Points (3, 2) and (7, 2) are on the graphs of both quadratic functions $f$ and $g$. The graph of $f$ opens downward, and the graph of $g$ opens upward. Which of these statements are true?

I. The graphs of $f$ and $g$ have the same axis of symmetry.
II. The graphs of $f$ and $g$ have the same $x$-intercepts.
III. The graph of $f$ has a maximum point, and the graph of $g$ has a minimum point.
IV. The graph of $f$ is the result of a reflection of the graph of $g$ across the $x$-axis.

**A** I only

**B** II only

**C** II and IV

**D** I and III

---

**18** A scientist needs to print a research report on her computer's printer. If she prints in black ink only, $b(t) = 152 - 33t$ describes the number of pages left to print after $t$ minutes. If she prints in colored ink, $c(t) = 152 - 30t$ describes the number of pages left to print after $t$ minutes. Based on this information, which statement is true?

**F** The printer prints 3 more pages per minute in colored ink than in black ink.

**G** The printer prints 3 fewer pages per minute in colored ink than in black ink.

**H** The printer prints the same number of pages per minute in either type of ink.

**J** The printer prints the entire research report in 152 minutes.

---

**19** Which expression is equivalent to $2m\left(\frac{3}{2}m + 1\right) + 3\left(\frac{5}{3}m - 2\right)$?

**A** $3m^2 + 5m - 1$

**B** $\frac{3}{4}m^2 + \frac{23}{9}m - 6$

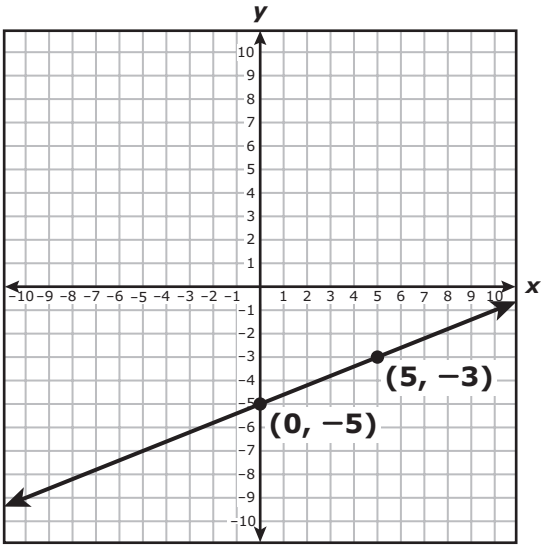
**C** $3m^2 + 7m - 6$

**D** $\frac{3}{4}m^2 + \frac{5}{9}m - 1$



GO ON

**20** The graph of an equation in the form $y = mx + b$ is shown on the grid.




Based on the graph, what is the value of $x$ when $y = -7$?

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

---

**21** When a contractor paints a square surface that has a side length of $x$ feet, he needs to know the area of the surface in order to buy the correct amount of paint. Since the contractor always adds 25 square feet to the area, he buys extra paint. Which function can be used to find the total area in square feet, $A(x)$, that the contractor will use to determine how much paint he needs to buy?

**A** $A(x) = 25x^2$

**B** $A(x) = (25 + x)^2$

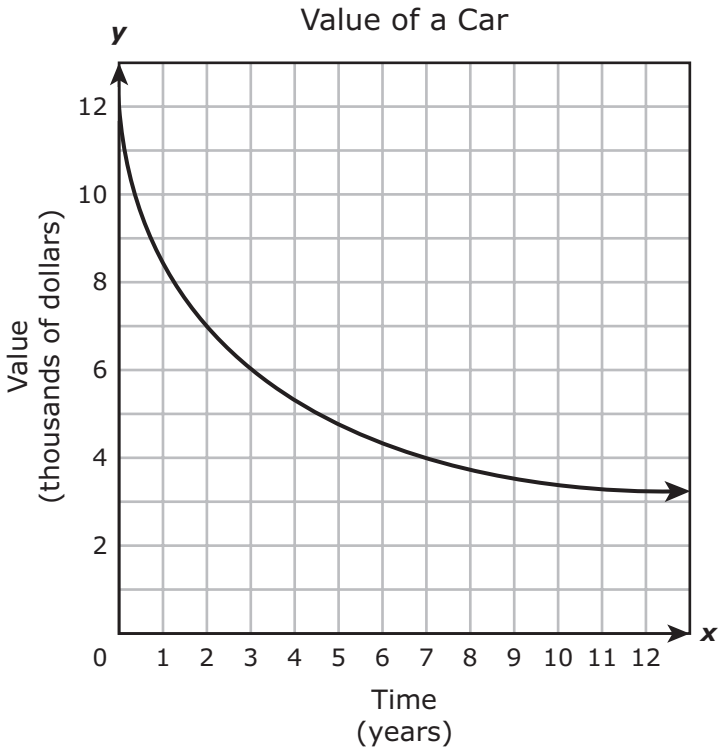
**C** $A(x) = (25x)^2$

**D** $A(x) = x^2 + 25$



GO ON

**22** The graph below shows the change in the value of a car over several years.




Based on the information in the graph, which conclusion appears to be true?

**F** The car lost about one-half of its value every 3 years.

**G** The car lost about one-quarter of its value every year.

**H** The car lost less of its value between years 9 and 10 than between years 1 and 2.

**J** The car lost more of its value between years 9 and 10 than between years 1 and 2.

---

**23** What is the equation in standard form of the line that passes through the point $(4, -8)$ and has a slope of $\frac{1}{4}$?

**A** $x - 4y = 36$

**B** $x - 4y = 28$

**C** $x - 4y = -36$

**D** $x - 4y = -28$



GO ON

**24** A new spiral notebook contains 30 more sheets of paper than a new memo book. The total number of sheets of paper in 3 new spiral notebooks and 5 new memo books is 810. Which system of equations can be used to find $s$, the number of sheets of paper in one new spiral notebook, and $m$, the number of sheets of paper in one new memo book?

**F** $s - m = 30$
$3s + 5m = 810$

**G** $s + m = 30$
$3s + 5m = 810$

**H** $s - m = 30$
$5s + 3m = 810$

**J** $s + m = 30$
$5s + 3m = 810$

---

**25** Which function is equivalent to $f(x) = 6x^2 - 13x + 5$?

**A** $f(x) = (3x - 1)(2x + 5)$

**B** $f(x) = (3x - 5)(2x - 1)$

**C** $f(x) = (3x - 1)(2x - 5)$

**D** $f(x) = (3x - 5)(2x + 1)$



GO ON

**26** The average blue whale gains weight at a constant rate each day during its first six months of life. The relationship between the average blue whale's weight in tons, $w$, and its age in days, $d$, for the first six months of its life can be modeled by the function $w = 0.1d + 3$. Based on this relationship, which statement is not true for the average blue whale?

**F** The average blue whale weighs 3 tons at birth.

**G** When the average blue whale is 5 days old, it weighs 20 tons.

**H** The average blue whale gains 0.1 ton per day during its first six months of life.

**J** When the average blue whale weighs 18 tons, it is 150 days old.

---

**27** Quadratic functions $g$ and $k$ are shown below.

$$g(x) = 5x^2 - 12$$
$$k(x) = 5x^2 + c$$

For what value of $c$ will the graph of $k$ be 9 units above the graph of $g$?

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

**28** A customer pays an annual membership fee of $85 to a neighborhood car wash. Each time he takes his car to the car wash, he pays only $7. The total amount of money he spends at the car wash in one year in dollars can be found using the function $y = 7x + 85$. What does the variable $x$ represent in this function?

**F** The total amount of money the customer spends each month at the car wash

**G** The number of months the customer has been a member at the car wash

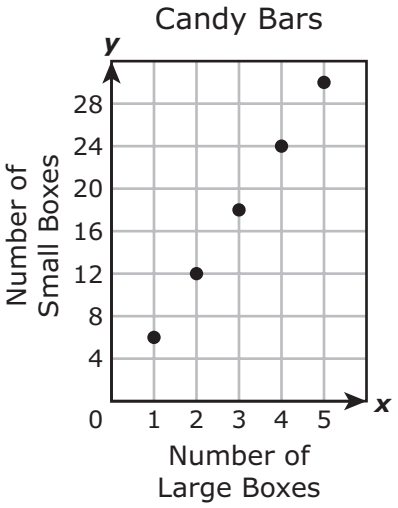
**H** The number of times the customer takes his car to the car wash in one year

**J** The cost each time the customer takes his car to the car wash

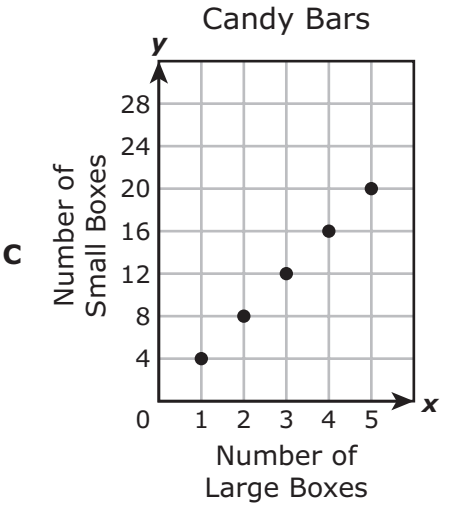
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**29** The owner of a store buys large boxes of candy bars from a warehouse and repackages them to sell in smaller boxes in his store. The store owner packages 4 candy bars in each small box. Each large box contains 24 candy bars. Which graph represents the relationship between $x$ large boxes and $y$ small boxes?

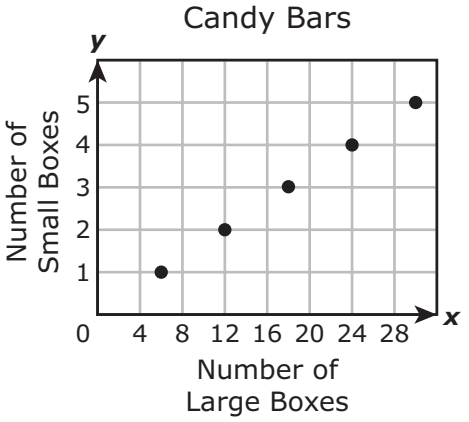
**A**



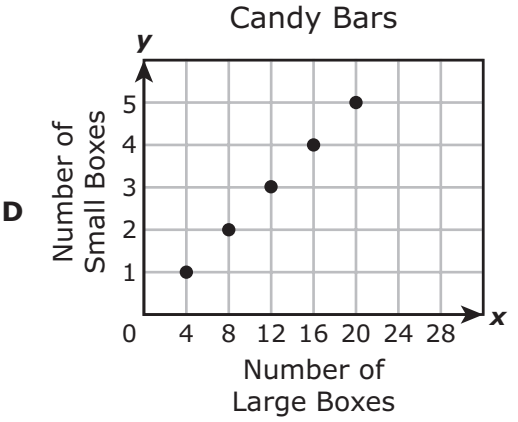

**C**




**B**




**D**






GO ON

**30** The function $L = 0.8T^2$ models the relationship between $L$, the length in feet of a pendulum, and $T$, the period in seconds of the pendulum. Which value is closest to the period in seconds for a pendulum that is 30 ft long?

**F** 5.4 s

**G** 4.9 s

**H** 6.8 s

**J** 6.1 s

---

**31** Airline passengers pay \$439 to fly to California. For this price, customers may check 2 pieces of luggage. There is a fee of \$25 for each additional piece of luggage a passenger wants to check. Which function can be used to find the amount in dollars a passenger has to pay to fly with $p$ pieces of luggage, where $p \geq 2$?

**A** $c = 25p + 439$

**B** $c = 25(p - 2) + 439$

**C** $c = \frac{p}{25} + 439$

**D** $c = \frac{p - 2}{25} + 439$



GO ON

**32** There are 32 founding members of an organization. The function $y = 3x^2 + 32$ can be used to determine the number of members in the organization after $x$ months. Based on this function, which statement is true?

**F** The number of members in the organization increases by 9 members each month.

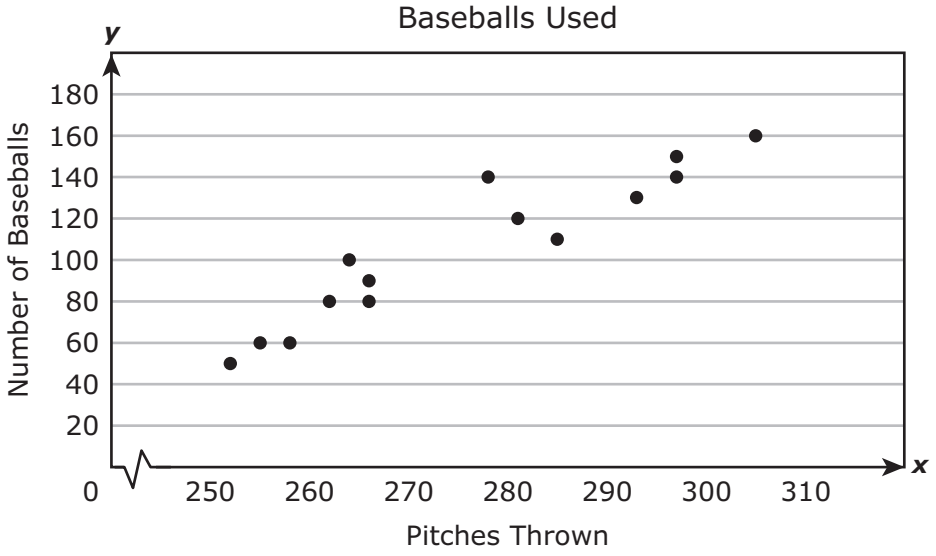
**G** At the end of 16 months, there will be 288 members in the organization.

**H** The number of members in the organization increases by 3 members each month.

**J** At the end of 6 months, there will be 140 members in the organization.

---

**33** The scatterplot below shows the relationship between the number of baseballs used in 14 games and the number of pitches thrown in these games.




Based on the scatterplot, what is the best prediction of the number of baseballs that will be used if 275 pitches are thrown?

**A** 150

**B** 60

**C** 100

**D** 160



GO ON

**34** A plane can carry a maximum cargo weight of 160,000 pounds. A company uses one of these planes to ship 2,000-pound containers. The total cargo weight is a function of the number of containers in the plane. What is the greatest value in the domain for this situation?

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

---

**35** What is the value of $x$ in the solution to this system of equations?

$$3x = 2y + 14$$
$$y = -6x + 18$$

**A** $\frac{10}{3}$

**B** $-2$

**C** $2$

**D** $-\frac{10}{3}$



GO ON

**36** The table represents some points on the graph of linear function $g$.

| $x$ | $g(x)$ |
|---|---|
| −4 | 13 |
| −2 | 10.5 |
| 2 | 5.5 |
| 8 | −2 |

The graph of $g$ was translated down 10 units to create the graph of function $h$. Which statement comparing the graphs of $g$ and $h$ is true?

**F** The $x$-intercept of the graph of $g$ is 10 units to the right of the $x$-intercept of the graph of $h$.

**G** The graph of $g$ is steeper than the graph of $h$.

**H** The $y$-intercept of the graph of $g$ is 10 units above the $y$-intercept of the graph of $h$.

**J** The graph of $g$ is less steep than the graph of $h$.

---

**37** What are the solutions to the equation $3x^2 + 15x = 18$?

**A** $x = -3$ and $x = -2$

**B** $x = -6$ and $x = 1$

**C** $x = 6$ and $x = 13$

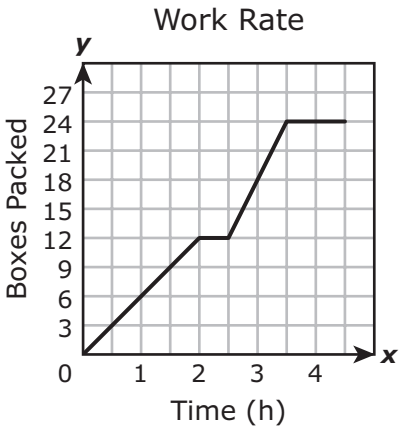
**D** $x = 0$ and $x = 1$



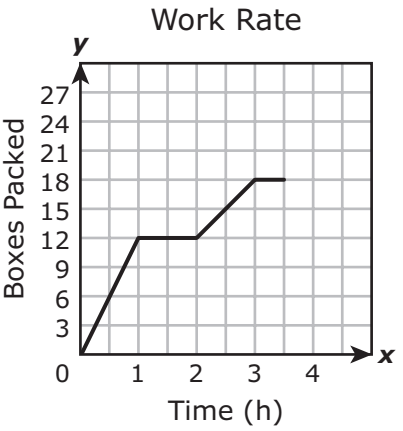
GO ON

**38** A factory worker packed 12 boxes at a constant rate, took a 30-minute break, and then continued packing boxes at twice the rate before the break. The worker then spent 1 hour cleaning the work area. Which graph models this situation?

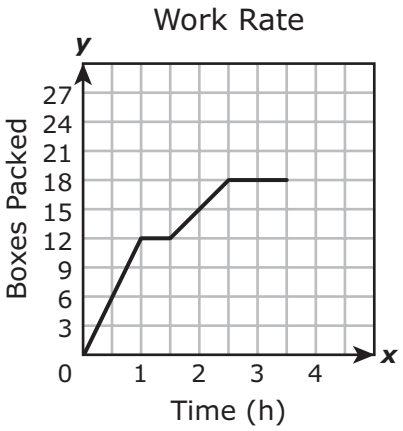
**F**



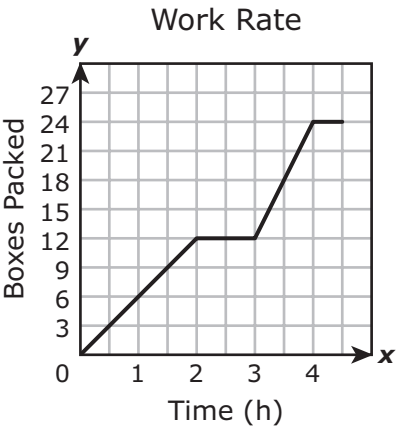

**H**




**G**




**J**






GO ON

**39** The table represents some points on the graph of linear function $h$.

| $x$ | $h(x)$ |
|---|---|
| 2 | 490 |
| 5 | 295 |
| 6 | 230 |
| 8 | 100 |

Which situation can be modeled by this function?

**A** The cost in dollars of buying $x$ items that cost \$245 each

**B** The number of miles an airplane had traveled after flying 555 miles per hour for $x$ hours

**C** The remaining number of miles on a 620-mile trip after traveling 65 miles per hour for $x$ hours

**D** The amount owed on a \$555 loan after paying \$65 per month for $x$ months

---

**40** Which inequality represents all the values of $x$ for $y \leq -6(x - 18) - 2$ when $y = 46$?

**F** $x \leq 10$

**G** $x \leq -11$

**H** $x \geq -11$

**J** $x \geq 10$



GO ON

**41** What is the zero of $r(x) = \frac{8}{3}x - 16$?

**A** $-16$

**B** $-6$

**C** 6

**D** 16

---

**42** The cost of parking in the garage at the airport is $16 per day. A separate parking facility outside the airport charges 25% less per day to park. What would be the savings in dollars and cents of parking for 6 days in the facility outside the airport instead of in the airport garage?

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

---

**43** Two functions are given below.

$$p(x) = \frac{5}{8}x - \frac{3}{11}$$

$$q(x) = \frac{8}{5}x - \frac{3}{11}$$

How does the graph of $p$ compare with the graph of $q$?

**A** The graph of $p$ has a different $y$-intercept than the graph of $q$.

**B** The graph of $p$ is less steep than the graph of $q$.

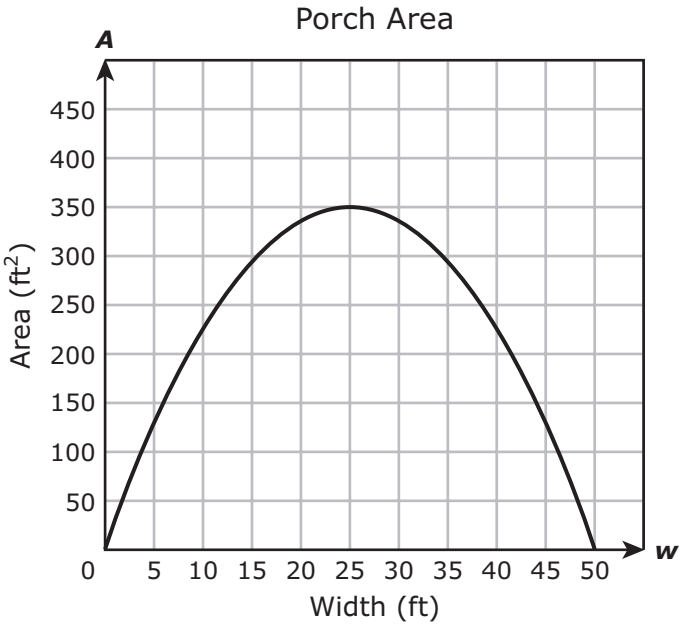
**C** The graph of $p$ is steeper than the graph of $q$.

**D** The graph of $p$ is parallel to the graph of $q$.



GO ON

**44** The graph models $A$, the area in square feet of a rectangular porch with a length that is $0.56w$ less than 28 ft given a width of $w$ feet.




Based on the graph, what is the width in feet of the porch with the greatest area?

**F** 175 ft

**G** 50 ft

**H** 25 ft

**J** 350 ft



GO ON

**45** The owner of a clothing store buys T-shirts for $c$ dollars each and sells them for $p$ dollars each. Last month she bought 600 T-shirts and sold 500 of them and made a profit of $2,800. This month she bought 400 T-shirts and sold them all and made a profit of $2,400. Which system of equations can be used to determine the values of $c$ and $p$?

**A** $500p - 600c = 2{,}800$
$400p - 400c = 2{,}400$

**B** $600p - 500c = 2{,}800$
$400p - 400c = 2{,}400$

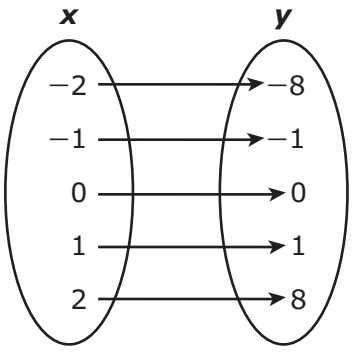
**C** $500p - 600c = 2{,}800$
$400p - c = 2{,}400$

**D** $600p - 500c = 2{,}800$
$400p - c = 2{,}400$

---

**46** Which representation does not show $y$ as a function of $x$?

**F**

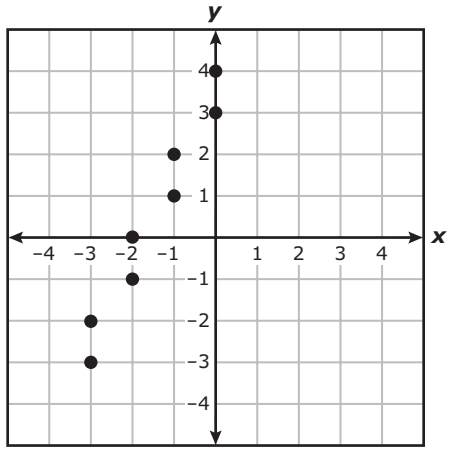



**G** {(−1, −2), (0, 1), (2, 4), (7, 7)}

**H**

| x | y |
|---|---|
| 2 | −6 |
| 5 | −1 |
| 7 | −1 |
| 8 | 3 |

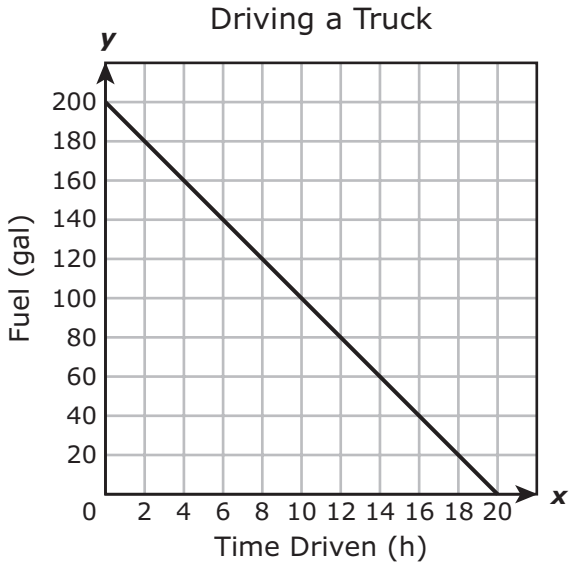
**J**






GO ON

**47** The graph below shows the relationship between the number of gallons of fuel remaining in a truck and the number of hours the truck has been driven.




What does the *x*-intercept of the graph represent?

**A** The number of gallons of fuel in the truck before any driving occurred

**B** The number of hours the truck was driven before running out of fuel

**C** The number of gallons of fuel the truck can hold

**D** The number of hours required to use one gallon of fuel

---

**48** If $f(x) = (x - 3)^2 + 4$ and $g(x) = x^3 + 2$, which statement is true?

**F** $f(-2) = g(-3)$

**G** $f(0) = g(-1)$

**H** $f(8) = g(3)$

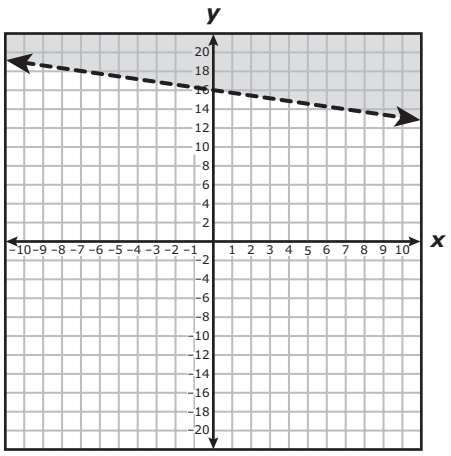
**J** $f(2) = g(1)$



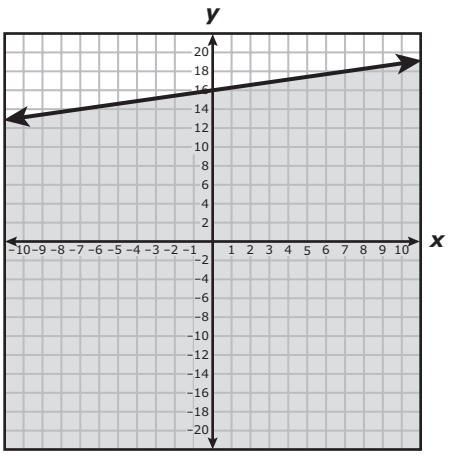
GO ON

**49** Which graph represents the inequality $-2x + 7y \leq 112$?

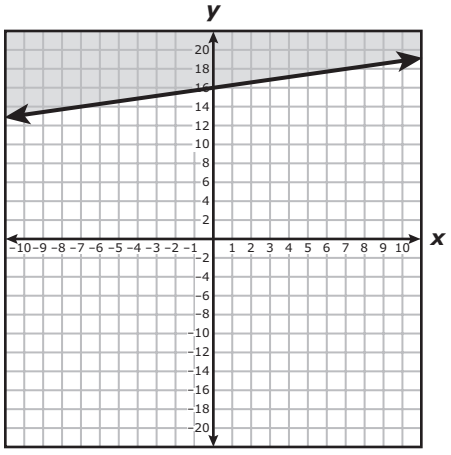
**A**



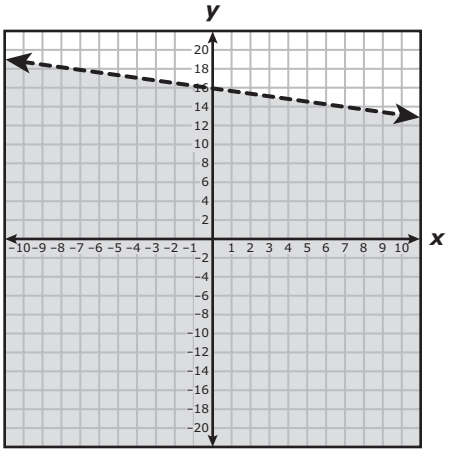

**C**




**B**




**D**




---

**50** If the value of $y$ varies inversely with $x$, which function represents the relationship between $x$ and $y$ if $y = 48$ when $x = 3$?

**F** $y = \frac{144}{x}$

**G** $y = \frac{16}{x}$

**H** $y = \frac{x}{16}$

**J** $y = \frac{x}{144}$



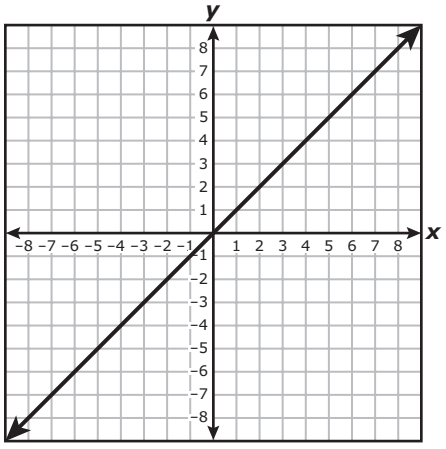
GO ON

**51** Function $k$ has a parent function. The table shows some ordered pairs that belong to $k$.

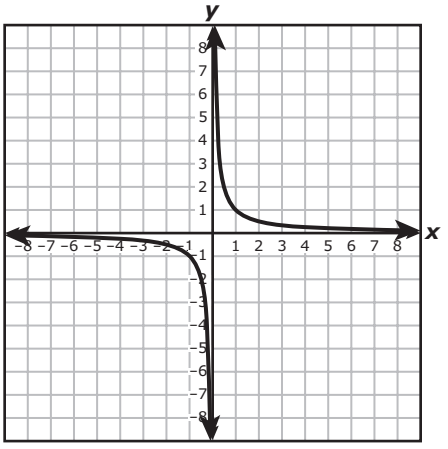
| $x$ | $k(x)$ |
|---|---|
| −4 | 20 |
| −3 | 13 |
| −1 | 5 |
| 1 | 5 |
| 2 | 8 |

Which graph shows the parent function of $k$?

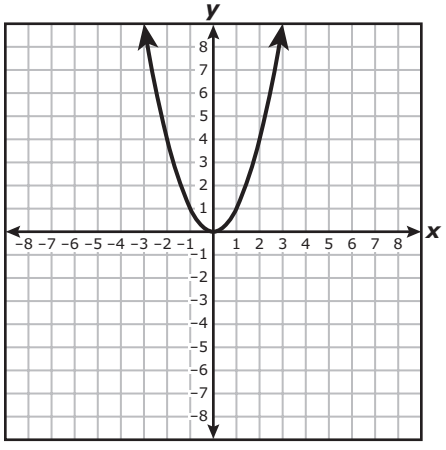
**A**



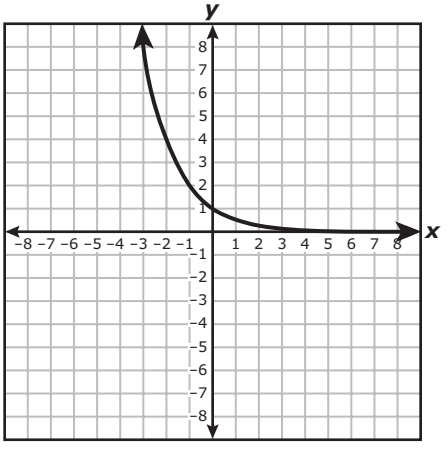

**C**




**B**




**D**






GO ON

**52** What is the solution to the system of equations below?

$$4x - 7y = -2$$
$$12x - 21y = -42$$

**F** The ordered pair $(-\frac{1}{2}, 0)$ is the solution.

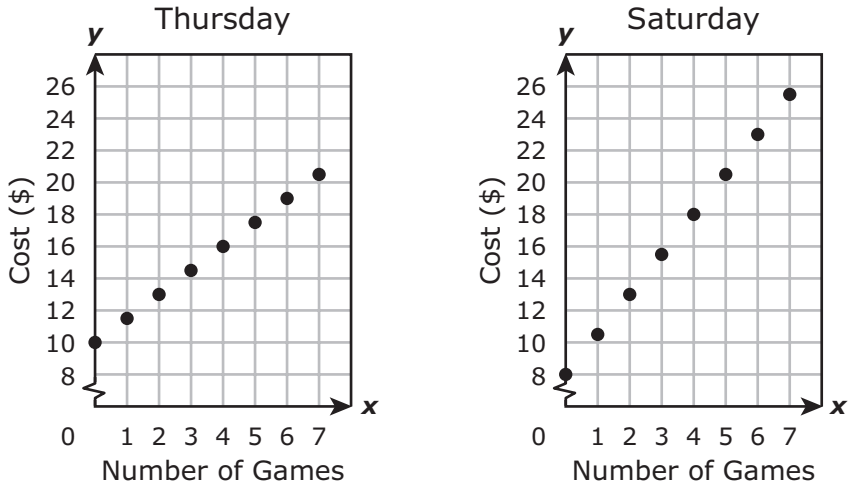
**G** The ordered pair $(0, \frac{2}{7})$ is the solution.

**H** There are an infinite number of solutions.

**J** There is no solution.

---

**53** The graphs show the cost of attending a county fair on Thursday and on Saturday and playing $x$ games each day.




Based on the graphs, which statement is true?

**A** The cost of each game on Thursday is $0.50 less than the cost of each game on Saturday.

**B** A person would spend $4 more to attend the fair and play 6 games on Saturday than on Thursday.

**C** The cost of each game on Saturday is $2 less than the cost of each game on Thursday.

**D** A person would spend $3 more to attend the fair and play 5 games on Thursday than on Saturday.



GO ON

**54** The student council sent its members on four field trips during the school year. The number of buses needed to transport the members on each trip is a function of the number of members who went on each trip. This function consists of only the ordered pairs (52, 3), (72, 4), (86, 5), and (105, 6). What is the domain for this situation?

**F** {52, 105}

**G** {3, 4, 5, 6}

**H** {52, 72, 86, 105}

**J** {3, 4, 5, 6, 52, 72, 86, 105}

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.



# STAAR
# Algebra I
# May 2015

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