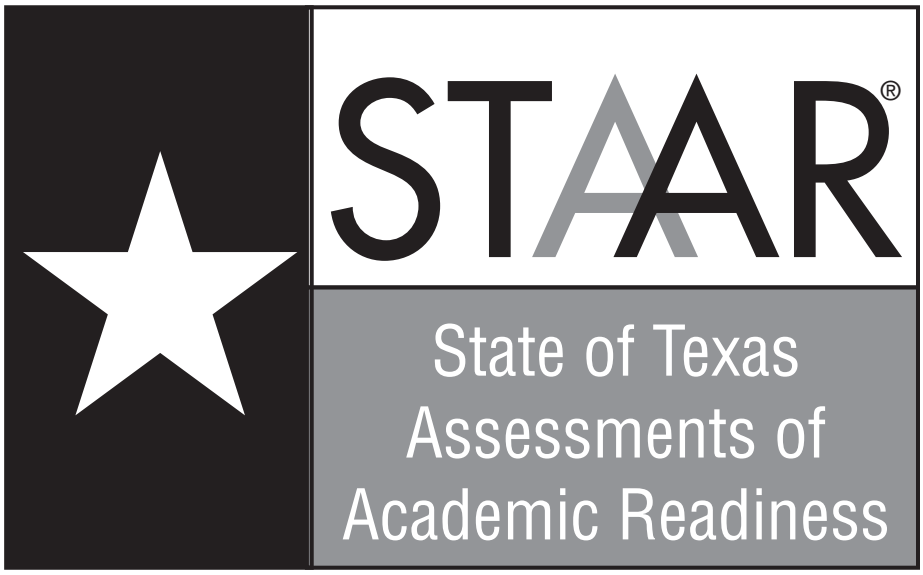


Algebra I

Administered May 2017

RELEASED

STAAR ALGEBRA I REFERENCE MATERIALS

STAAR State of Texas Assessments of Academic Readiness

FACTORING

Perfect square trinomials	$a^2 + 2ab + b^2 = (a + b)^2$ $a^2 - 2ab + b^2 = (a - b)^2$
Difference of squares	$a^2 - b^2 = (a - b)(a + b)$

PROPERTIES OF EXPONENTS

Product of powers	$a^m a^n = a^{(m+n)}$
Quotient of powers	$\frac{a^m}{a^n} = a^{(m-n)}$
Power of a power	$(a^m)^n = a^{mn}$
Rational exponent	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$
Negative exponent	$a^{-n} = \frac{1}{a^n}$

LINEAR EQUATIONS

Standard form	$Ax + By = C$
Slope-intercept form	$y = mx + b$
Point-slope form	$y - y_1 = m(x - x_1)$
Slope of a line	$m = \frac{y_2 - y_1}{x_2 - x_1}$

QUADRATIC EQUATIONS

Standard form	$f(x) = ax^2 + bx + c$
Vertex form	$f(x) = a(x - h)^2 + k$
Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Axis of symmetry	$x = \frac{-b}{2a}$

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 Which expression is equivalent to $\sqrt{147}$?

A $3\sqrt{7}$

B $7\sqrt{3}$

C $21\sqrt{7}$

D $49\sqrt{3}$

---

2 A drummer and a guitarist each wrote songs for their band. The guitarist wrote 8 fewer than twice the number of songs that the drummer wrote. They wrote a total of 46 songs.

Which system of equations models this situation if the drummer wrote d songs and the guitarist wrote g songs?

F $g = 2d - 8$
$g + d = 46$

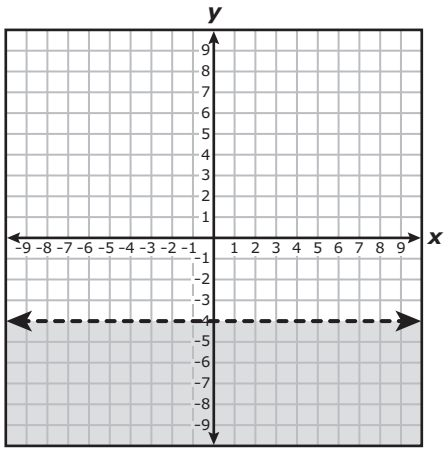
G $g = 8 - 2d$
$g = 46 - d$

H $d = 2g - 8$
$d = 46 - g$

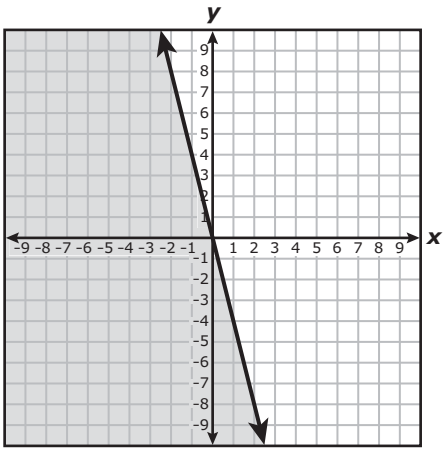
J $d = 8 - 2g$
$d + g = 46$

3 Which graph best represents the solution set of $y \leq -4x$?

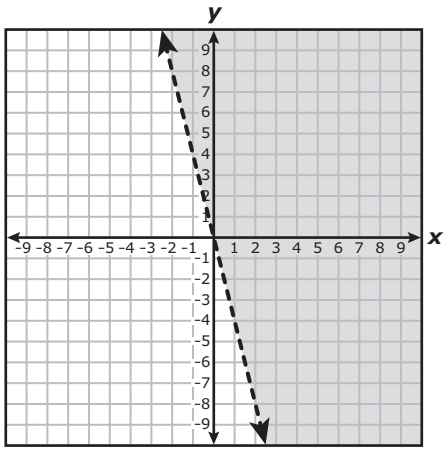
A



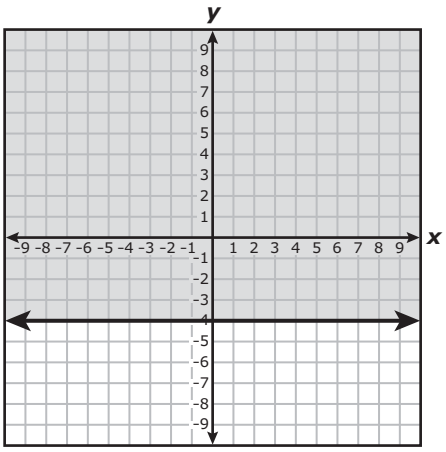
C



B



D



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4 The graph of $f(x) = x^2$ was transformed to create the graph of $g(x) = (x - 7.5)^2$. Which of these describes this transformation?

F A horizontal shift to the right 7.5 units

G A horizontal shift to the left 7.5 units

H A vertical shift down 56.25 units

J A vertical shift up 56.25 units

5 A set of weights includes a 4 lb barbell and 6 pairs of weight plates. Each pair of plates weighs 20 lb. If x pairs of plates are added to the barbell, the total weight of the barbell and plates in pounds can be represented by $f(x) = 20x + 4$.

What is the range of the function for this situation?

A $\{0, 1, 2, 3, 4, 5, 6\}$

B $\{4, 24, 44, 64, 84, 104, 124\}$

C $\{0, 2, 4, 6\}$

D $\{4, 44, 84, 124\}$

---

6 The area of a rectangle is $54x^9y^8$ square yards. If the length of the rectangle is $6x^3y^4$ yards, which expression represents the width of the rectangle in yards?

F $9x^3y^2$

G $48x^6y^4$

H $9x^6y^4$

J $60x^{12}y^{12}$

---

7 The total number of seats in an auditorium is modeled by $f(x) = 2x^2 - 6x$, where x represents the number of rows of seats. How many rows are there in the auditorium if it has a total of 416 seats?

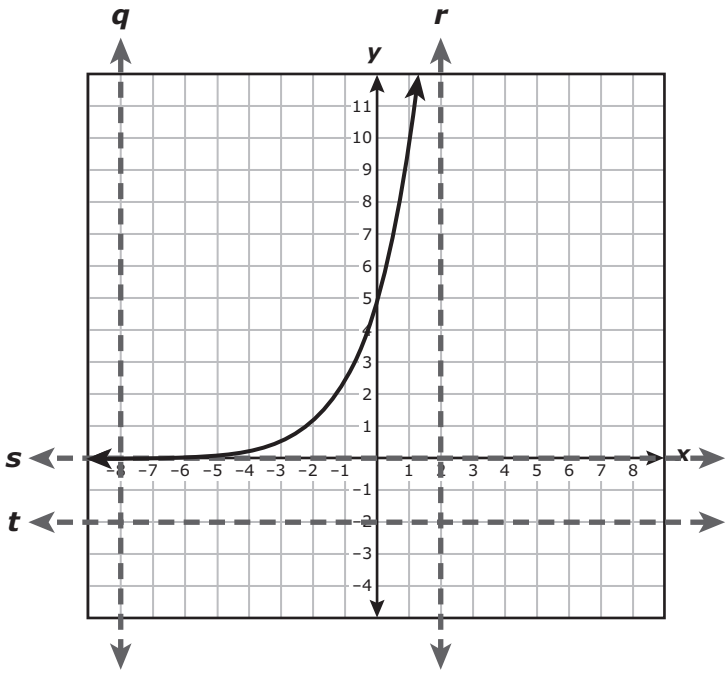
A 32

B 13

C 20

D 16

8 The graph of an exponential function is shown on the grid.



Which dashed line is an asymptote for the graph?

F Line *q*

G Line *r*

H Line *s*

J Line *t*

---

9 Which situation best represents causation?

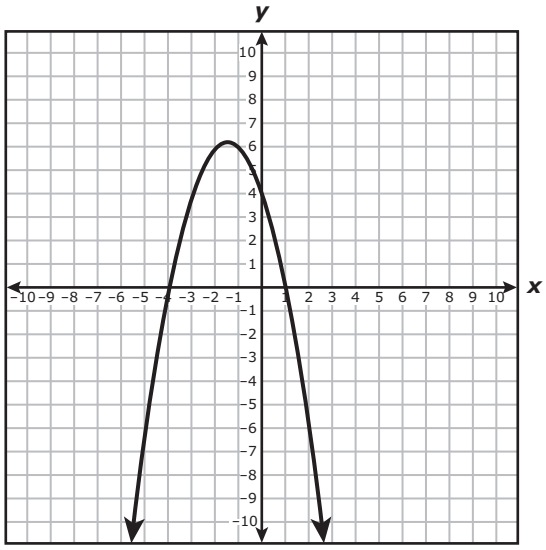
A When the number of bus stops increases, the number of car sales decreases.

B When fewer firefighters report to a house fire, the damage caused by the fire decreases.

C When ice cream sales increase, incidents of sunburn increase.

D When it rains several inches, the water level of a lake increases.

10 The graph of a quadratic function is shown on the grid.



Which function is best represented by this graph?

F $f(x) = x^2 + 3x - 4$

G $f(x) = -x^2 - 3x + 4$

H $f(x) = x^2 - 3x - 4$

J $f(x) = -x^2 + 3x + 4$

---

11 What is the solution to $8x - 3(2x - 4) = 3(x - 6)$?

A 6

B 2

C 30

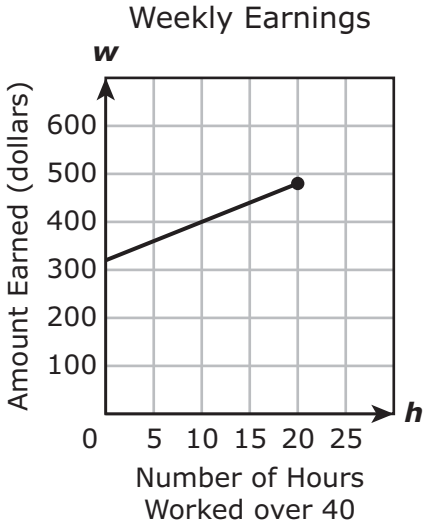
D No solution

GO ON

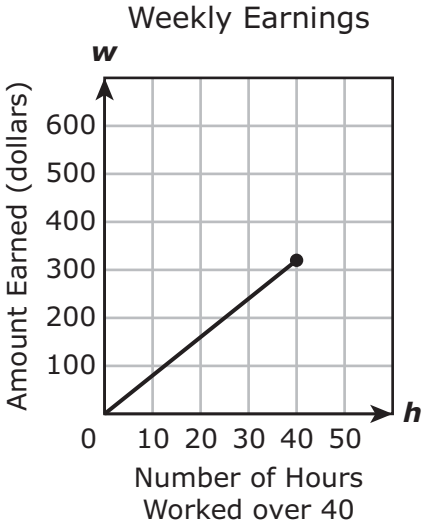
12 A lifeguard earns $320 per week for working 40 hours plus $12 per hour worked over 40 hours. A lifeguard can work a maximum of 60 hours per week.

Which graph best represents the lifeguard's weekly earnings in dollars for working *h* hours over 40?

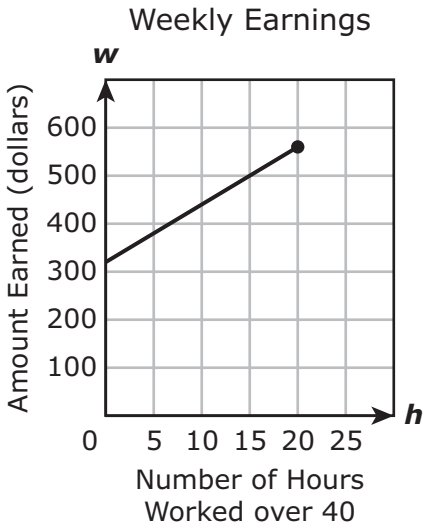
F



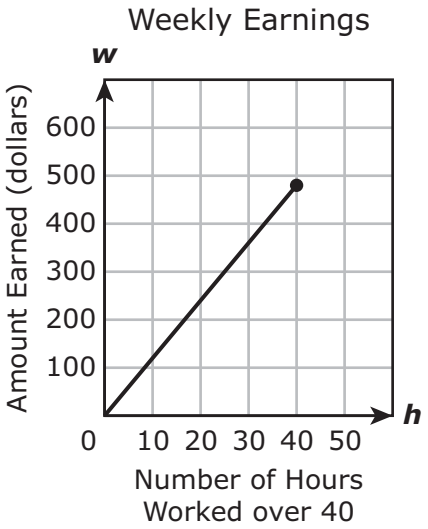
H



G



J



GO ON

13 A shoe company is going to close one of its two stores and combine all the inventory from both stores. These polynomials represent the inventory in each store:

Store A: $\frac{1}{2}g^2 + \frac{7}{2}$

Store B: $3g^2 - \frac{4}{5}g + \frac{1}{4}$

Which expression represents the combined inventory of the two stores?

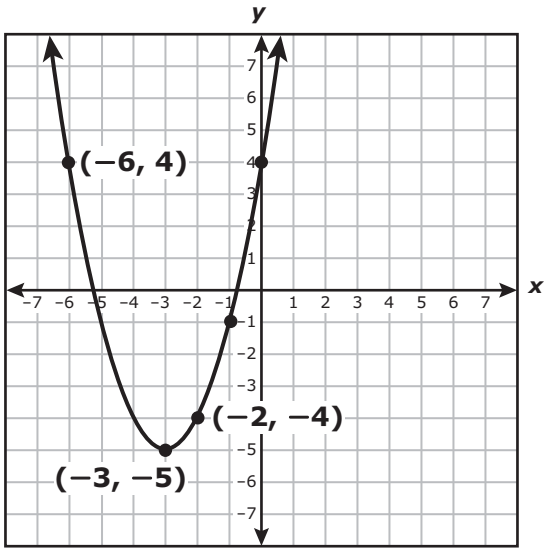
A $\frac{7}{2}g^2 - \frac{4}{5}g + \frac{15}{4}$

B $\frac{7}{2}g^2 - \frac{4}{5}g + \frac{4}{3}$

C $\frac{7}{2}g^2 + \frac{4}{5}g + \frac{15}{4}$

D $\frac{7}{2}g^2 + \frac{4}{5}g + \frac{4}{3}$

14 The graph of quadratic function f is shown on the grid.



What is the y-intercept of the graph of f?

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

---

15 A particular type of cell doubles in number every hour. Which function can be used to find the number of cells present at the end of h hours if there are initially 4 of these cells?

A $n = 4\left(\frac{1}{2}\right)^h$

B $n = 4(2)^h$

C $n = 4 + (2)^h$

D $n = 4 + \left(\frac{1}{2}\right)^h$

16 What is the slope of the line represented by $5x - 12y = 24$?

F -2

G $\frac{24}{5}$

H -12

J $\frac{5}{12}$

---

17 Which expression is equivalent to $6x^2 + 13x + 5$?

A $(2x + 5)(3x - 1)$

B $(2x - 5)(3x + 1)$

C $(2x + 1)(3x + 5)$

D $(2x - 1)(3x - 5)$

GO ON

18 A bus travels two different routes: the Green Route and the Blue Route. The routes are different lengths.

- On Monday the bus traveled the Green Route 6 times and the Blue Route 5 times, traveling a total of 52 miles.
- On Tuesday the bus traveled the Green Route 12 times and the Blue Route 13 times, traveling a total of 119 miles.

What is the length of the Green Route in miles?

F 4.4 mi

G 4.5 mi

H 6.4 mi

J 6.8 mi

---

19 The table shows the heights and the lengths of several rectangles.

Height (in.)	41	70	21	34	10	92	54	24	10	35	42	66
Length (in.)	21	25	32	12	16	45	40	23	45	35	21	14

What does the correlation coefficient for the data indicate about the strength of the linear association between the height and the length of these rectangles?

A Weak negative correlation

B Strong negative correlation

C Weak positive correlation

D Strong positive correlation

20 The expression $(x^3)(x^{-17})$ is equivalent to x^n. What is the value of n?

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

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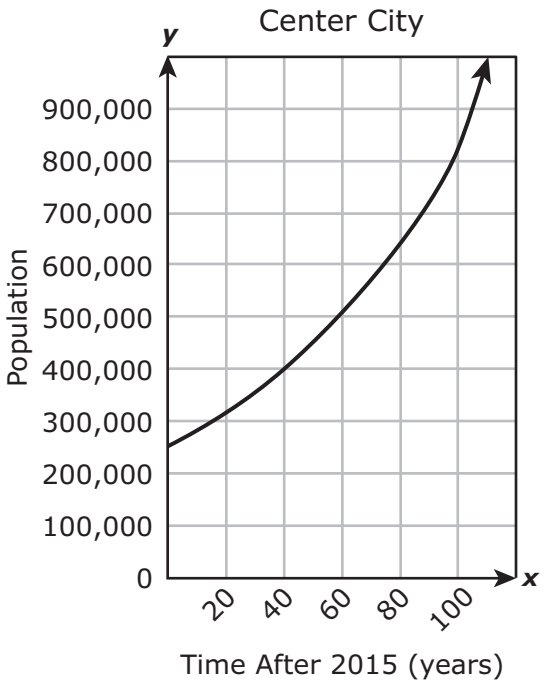
21 The population of Center City is modeled by exponential function f, where x is the number of years after the year 2015. The graph of f is shown on the grid.



Which inequality best represents the range of f in this situation?

A $x \geq 0$

B $y \geq 250{,}000$

C $0 \leq x \leq 110$

D $250{,}000 \leq y \leq 1{,}000{,}000$

GO ON

22 A sequence can be generated by using $a_n = 4a_{(n-1)}$, where $a_1 = 6$ and n is a whole number greater than 1. What are the first four terms in the sequence?

F 6, 24, 96, 384

G 6, 10, 14, 18

H 6, 20, 100, 500

J 6, 20, 76, 300

---

23 What is the equation in slope-intercept form of the line that passes through the points $(-4, 47)$ and $(2, -16)$?

A $y = -\frac{21}{2}x + \frac{979}{21}$

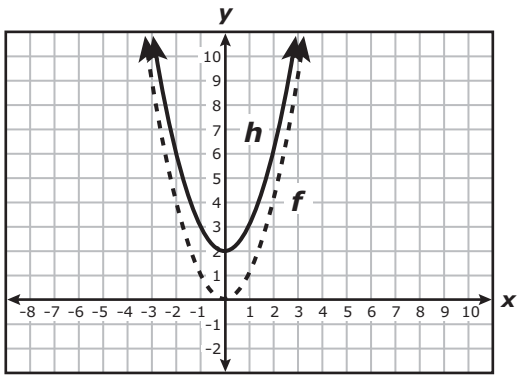
B $y = -\frac{2}{21}x + \frac{979}{21}$

C $y = -\frac{21}{2}x + 5$

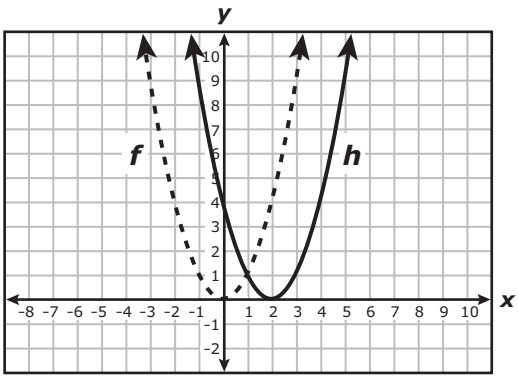
D $y = -\frac{2}{21}x + 5$

24 The graph of $f(x) = x^2$ is transformed to create the graph of $h(x) = 2f(x)$. Which graph best represents f and h?

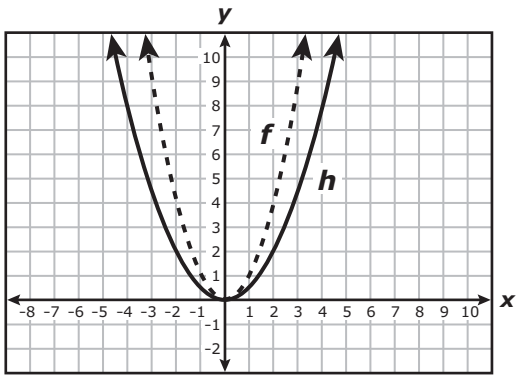
F



H



G



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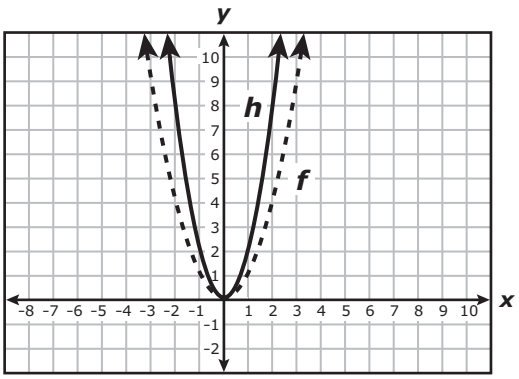

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25 A student is ordering a flower arrangement. She can choose any combination of roses and carnations for her flower arrangement, and she does not want to spend more than $30.

If roses cost $3 each and carnations cost $2 each, which inequality represents all possible combinations of x roses and y carnations?

A $3x + 2y < 30$

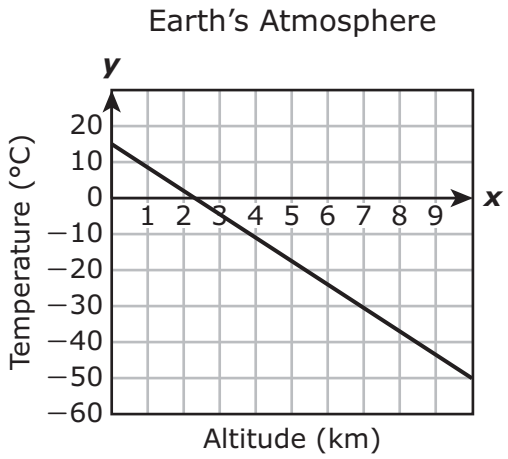
B $3x + 2y \leq 30$

C $2x + 3y > 30$

D $2x + 3y \leq 30$

GO ON

26 The graph models the linear relationship between the temperature of Earth's atmosphere and the altitude above sea level.



Which of these best represents the rate of change of the temperature with respect to altitude?

F −6.5°C/km

G −3.5°C/km

H −0.29°C/km

J −0.15°C/km

---

27 The value of y is directly proportional to the value of x. If $y = 35$ when $x = 140$, what is the value of y when $x = 70$?

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

GO ON

28 Which expression is equivalent to $m^2 - 13m - 30$?

F $(m - 15)(m + 2)$

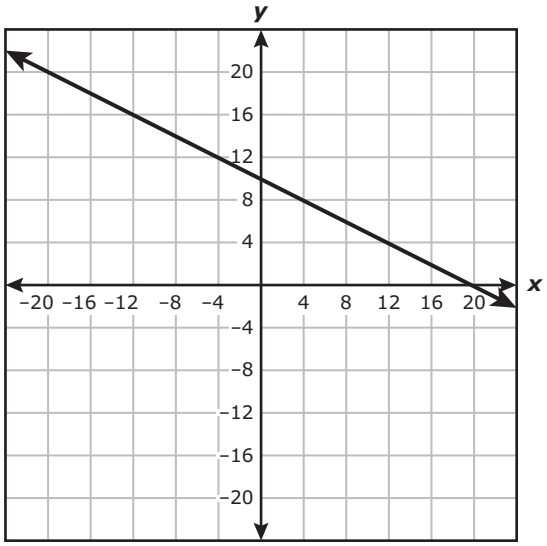
G $(m - 10)(m - 3)$

H $(m + 15)(m - 2)$

J $(m + 10)(m + 3)$

---

29 The line graphed on the grid represents the first of two equations in a system of linear equations.



If the graph of the second equation in the system passes through the points $(-12, 20)$ and $(4, 12)$, which statement is true?

A The only solution to the system is $(10, 5)$.

B The only solution to the system is $(0, 14)$.

C The system has no solution.

D The system has an infinite number of solutions.

30 What is the domain of $f(x) = 9 - x^2$?

F $f(x) \geq 9$

G All real numbers

H $-3 \leq x \leq 3$

J $x \leq 9$

---

31 A student used $f(x) = 5.00(1.012)^x$ to show how the balance in a savings account will increase over time. What does the 5.00 represent?

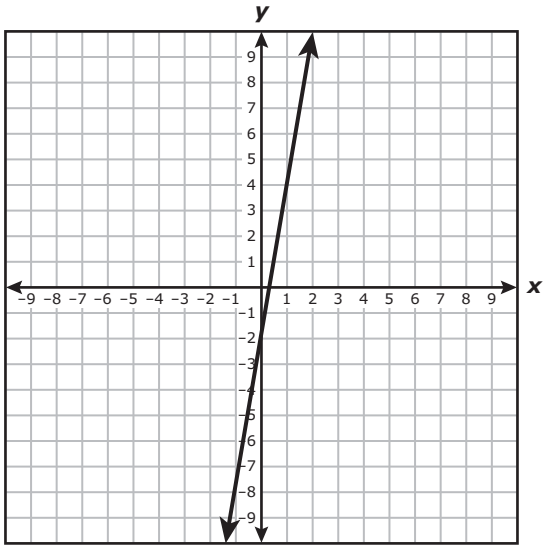
A The interest the savings account earned for the first year

B The annual interest rate of the savings account

C The number of years the savings account has earned interest

D The starting balance of the savings account

32 The graph of a function is shown on the grid.



Which ordered pair best represents the location of the *y*-intercept?

F $(\frac{1}{3}, 0)$

G $(0, -2)$

H $(0, \frac{1}{3})$

J $(-2, 0)$

GO ON

33 Researchers in Antarctica discovered a warm sea current under a glacier that is causing the glacier to melt. The ice shelf of the glacier had a thickness of approximately 450 m when it was first discovered. The thickness of the ice shelf is decreasing at an average rate of 0.06 m per day.

Which function can be used to find the thickness of the ice shelf in meters x days since the discovery?

A $t(x) = 450 - 0.06x$

B $t(x) = -0.06(x + 450)$

C $t(x) = 450 + 0.06x$

D $t(x) = 0.06(x + 450)$

---

34 What is the positive solution to the equation $0 = \frac{1}{3}x^2 - 3$?

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

---

35 The amount of fertilizer in a landscaping company's warehouse decreases at a rate of 3% per week. The amount of fertilizer in the warehouse was originally 78,000 cubic yards.

Which function models the amount of fertilizer in cubic yards left after w weeks?

A $f(w) = 0.97(78{,}000)^w$

B $f(w) = 1.03(78{,}000)^w$

C $f(w) = 78{,}000(0.97)^w$

D $f(w) = 78{,}000(1.03)^w$

36 What is the equation of the line that passes through the point $(-2, 7)$ and has a slope of zero?

F $x = 7$

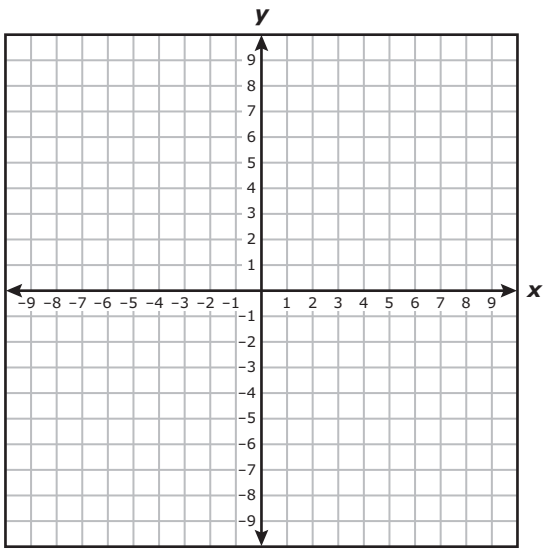
G $y = -2$

H $x = -2$

J $y = 7$

---

37 Which ordered pair is in the solution set of $y \geq \frac{1}{3}x + 4$?



A $(-6, 1)$

B $(-1, 6)$

C $(6, -1)$

D $(1, -6)$

GO ON

38 Which table does NOT show y as a function of x?

F

x	$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$
y	9	11	9	14	7

G

x	14	15	16	17	18
y	100	80	110	100	90

H

x	−0.2	0.6	−1.3	1.0	−0.2
y	5.8	−3.7	4.4	−0.9	8.1

J

x	−24	21	24	−27	29
y	2.7	2.8	2.7	2.5	2.5

39 A projectile is launched into the air from the ground. The table shows the height of the projectile, $h(t)$, at different times.

Projectile Height

Time (seconds)	Height (meters)
5	1,353
10	2,460
15	3,323
20	3,940
25	4,313
30	4,440
35	4,323

Based on the table, which function can best be used to model this situation?

A $h(t) = 99t^2 + 858$

B $h(t) = -4.9t^2 + 295t + 0.6$

C $h(t) = -4.9t^2 + 295t + 2$

D $h(t) = 99t^2 + 1{,}470.3$

---

40 Which value of x makes the equation $0.75(x + 20) = 2 + 0.5(x - 2)$ true?

F 64

G −64

H 56

J −56

41 Which expression is a factor of $18x^2 - 15x + 2$?

A $3x - 2$

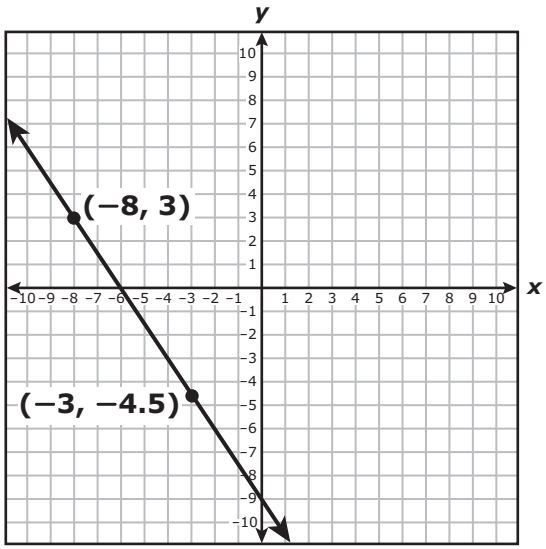
B $9x - 1$

C $x - 2$

D $2x - 1$

---

42 The graph of linear function g is shown on the grid.



What is the zero of g?

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

GO ON

43 Which quadratic function in vertex form can be represented by the graph that has a vertex at $(3, -7)$ and passes through the point $(1, -10)$?

A $y = \frac{3}{4}(x + 3)^2 + 7$

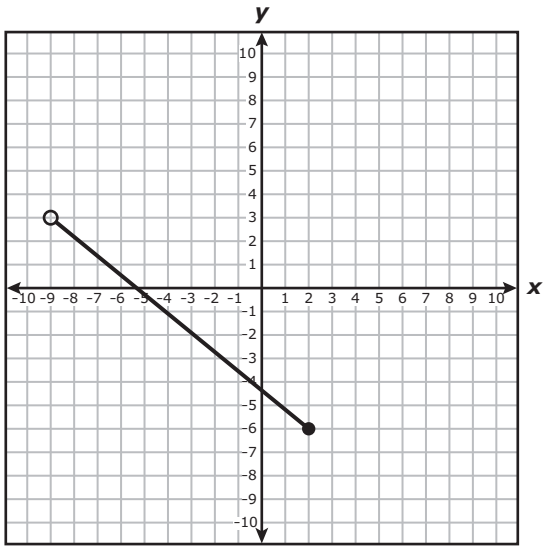
B $y = -\frac{3}{4}(x + 3)^2 - 7$

C $y = \frac{3}{4}(x - 3)^2 + 7$

D $y = -\frac{3}{4}(x - 3)^2 - 7$

---

44 The graph of part of linear function g is shown on the grid.



Which inequality best represents the domain of the part shown?

F $-9 < x \leq 2$

G $-9 \leq x < 2$

H $-6 < g(x) \leq 3$

J $-6 \leq g(x) < 3$

45 A student graphed $f(x) = x$ and $g(x) = f(x) + 3$ on the same coordinate grid. Which statement describes how the graphs of f and g are related?

A The graph of f is shifted 3 units up to create the graph of g.

B The graph of f is steeper than the graph of g.

C The graph of f is shifted 3 units down to create the graph of g.

D The graph of f is less steep than the graph of g.

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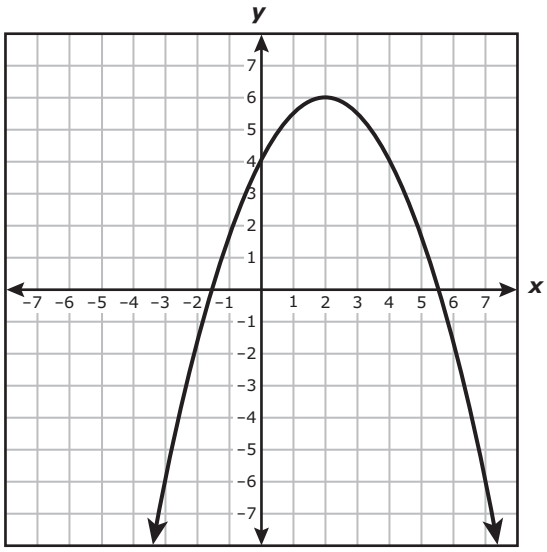
46 The graph of a quadratic function is shown on the grid.



Which equation best represents the axis of symmetry?

F $y = 6$

G $x = 2$

H $y = 4$

J $x = 0$

47 If $p(x) = 5(x^2 + 1) + 16$, what is the value of $p(11)$?

A 690

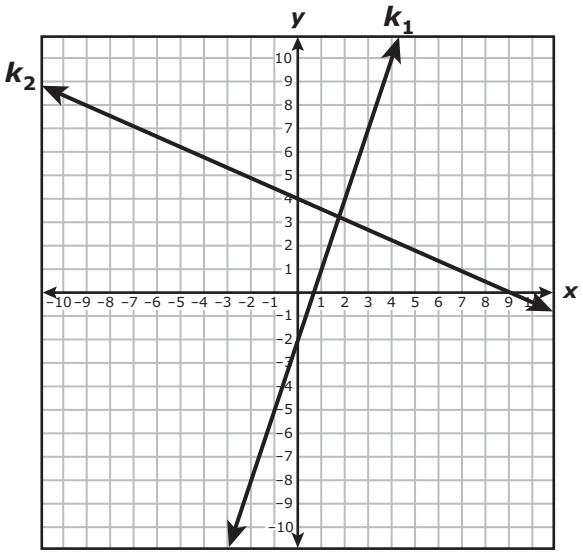
B 736

C 622

D 626

---

48 The graphs of lines k_1 and k_2 are shown on the grid.



Which system of equations is best represented by this graph?

F $3x - y = 2$
$4x + 9y = 36$

G $3x - y = 6$
$4x + 9y = 4$

H $x - 3y = -18$
$9x + 4y = 9$

J $x + y = 10$
$9x + 4y = 13$

49 Which statement about the graph of $y = \frac{1}{3}\left(\frac{2}{3}\right)^x$ is true?

A The graph has a vertical asymptote.

B The graph crosses the y-axis at $(0, \frac{2}{9})$.

C The graph has an asymptote at $y = \frac{1}{3}$.

D The graph decreases from left to right.

---

50 The table represents some points on the graph of a linear function.

x	y
−20	−268
−14	−196
−8	−124
−1	−40

Which equation represents the same relationship?

F $y + 268 = \frac{1}{12}(x + 20)$

G $y + 20 = \frac{1}{12}(x + 268)$

H $y + 268 = 12(x + 20)$

J $y + 20 = 12(x + 268)$

51 Which expression is equivalent to $(7x^3)^2(x^8)^{\frac{1}{2}}$?

A $14x^{10}$

B $49x^{10}$

C $14x^7$

D $49x^7$

---

52 The function $y = 3.75 + 1.5(x - 1)$ can be used to determine the cost in dollars for a taxi ride of x miles. What is the rate of change of the cost in dollars with respect to the number of miles?

F \$1.50 per mile

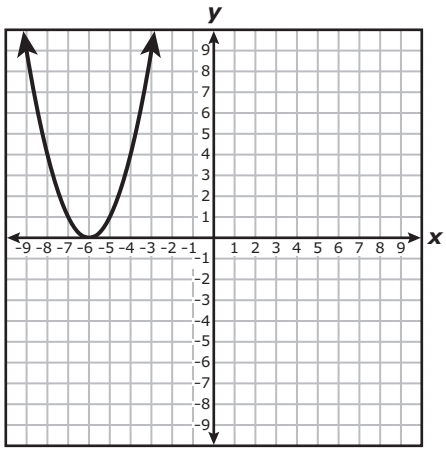
G \$3.75 per mile

H \$4.25 per mile

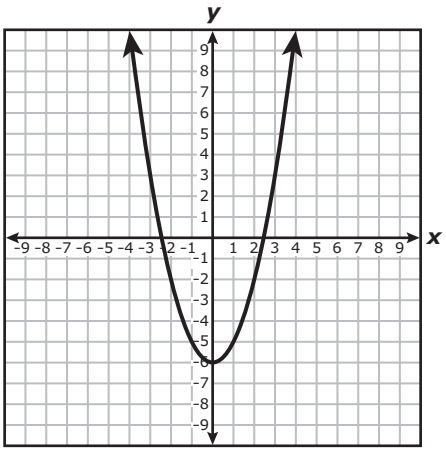
J \$5.25 per mile

53 Which graph best represents a function with a range of all real numbers greater than or equal to −6?

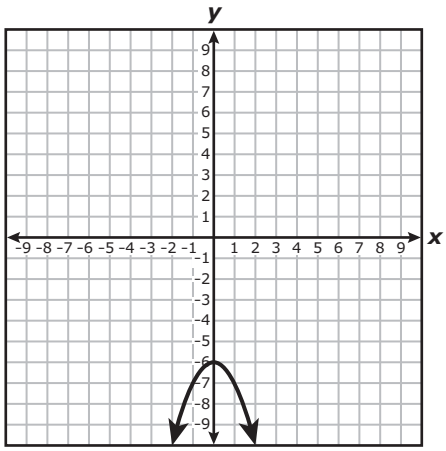
A



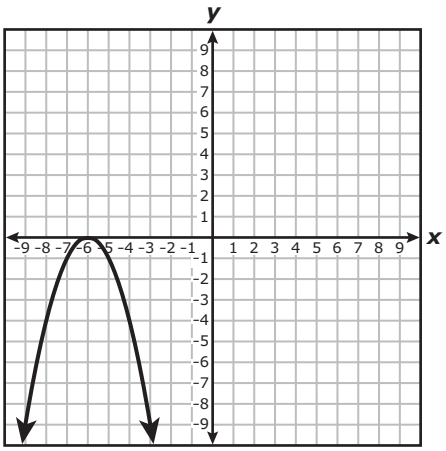
C



B



D



GO ON

54 What is the value of x in the solution to this system of equations?

$$y + 2x = -1$$

$$y = \frac{1}{2}x + 4$$

F $\frac{6}{5}$

G -2

H $-\frac{10}{3}$

J 3

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

STOP

STAAR
Algebra I
May 2017