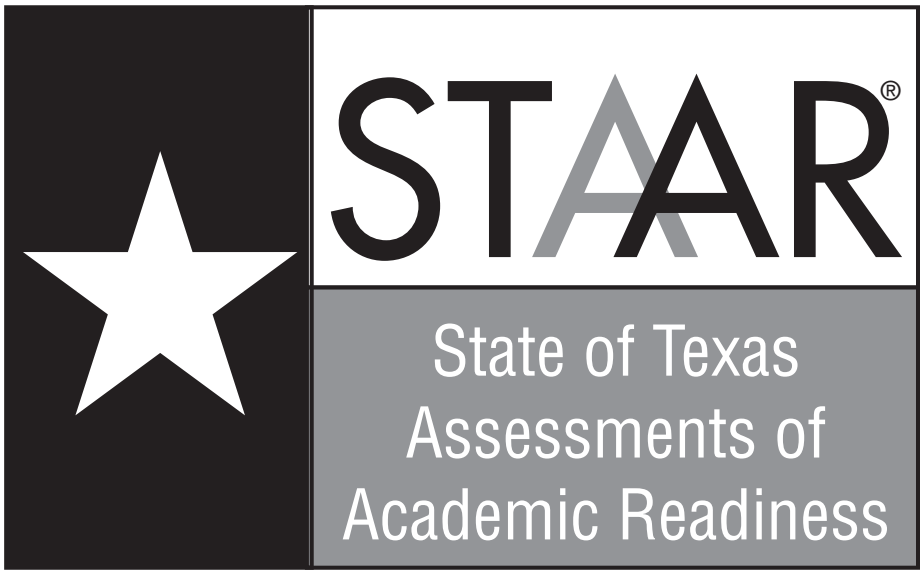

Algebra I

Administered May 2021

RELEASED

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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 $\sqrt{184}$?

A 92

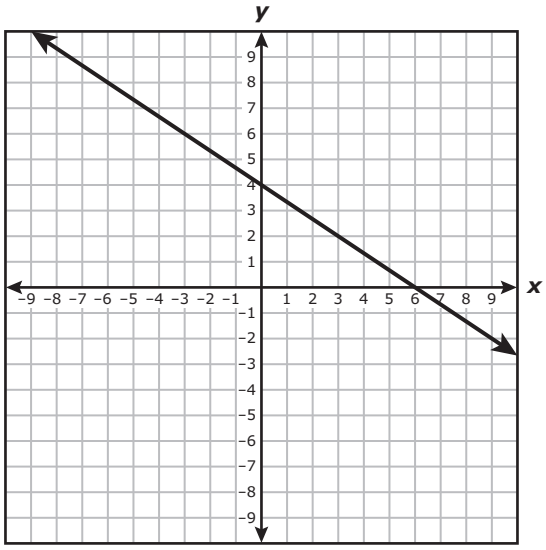
B $2\sqrt{46}$

C $4\sqrt{23}$

D $4\sqrt{46}$

GO ON

2 The graph of a linear function is shown on the grid.



Which function is best represented by this graph?

F $g(x) = 6x + 4$

G $g(x) = 4x - \frac{2}{3}$

H $g(x) = -\frac{3}{2}x + 6$

J $g(x) = -\frac{2}{3}x + 4$

GO ON

3 The values in the table represent a linear relationship between x and y.

x	−8.5	−6.5	−2.5	−1
y	−92	−72	−32	−17

What is the rate of change of y with respect to x?

A 10

B 17

C −10

D −17

---

4 Given $g(x) = x^2 - 6x - 16$, which statement is true?

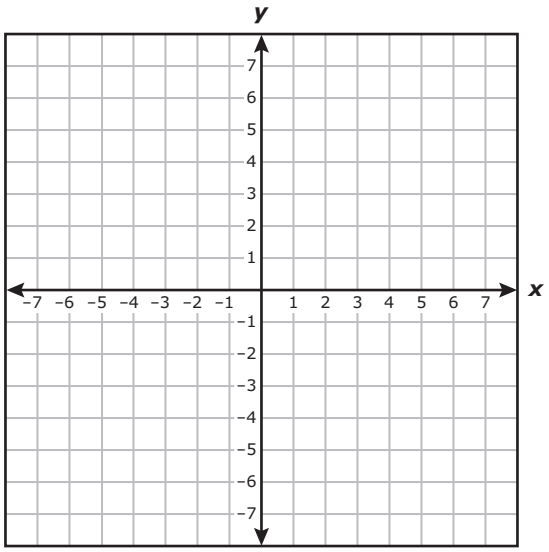
F The zeros are −8 and 2, because the factors of g are $(x + 8)$ and $(x - 2)$.

G The zeros are −8 and −2, because the factors of g are $(x + 8)$ and $(x + 2)$.

H The zeros are −2 and 8, because the factors of g are $(x + 2)$ and $(x - 8)$.

J The zeros are 2 and 8, because the factors of g are $(x - 2)$ and $(x - 8)$.

5 Which ordered pair is in the solution set of $8x + 16y > 32$?



A (0, 2)

B (−3, 5)

C (−1, 1)

D (4, 0)

---

6 What is the equation in slope-intercept form of the line that passes through the points (−26, −11) and (39, 34)?

F $y = -\frac{9}{13}x + 7$

G $y = -\frac{9}{13}x - 7$

H $y = \frac{9}{13}x + 7$

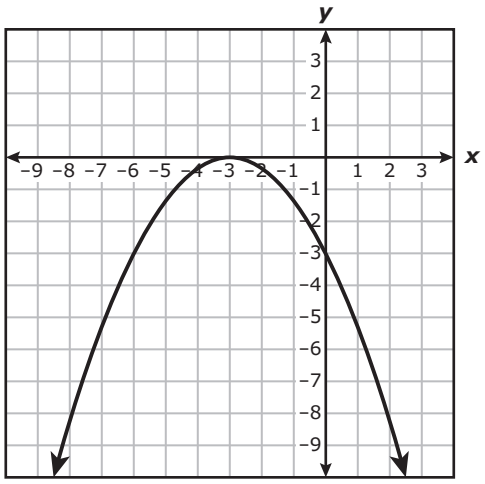
J $y = \frac{9}{13}x - 7$

7 Two characteristics of quadratic function p are given.

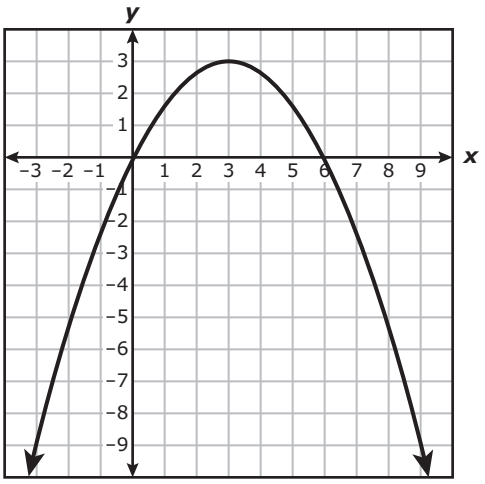
- The axis of symmetry of the graph of p is $x = -3$.
- Function p has exactly one zero.

Based on this information, which graph could represent p?

A



C



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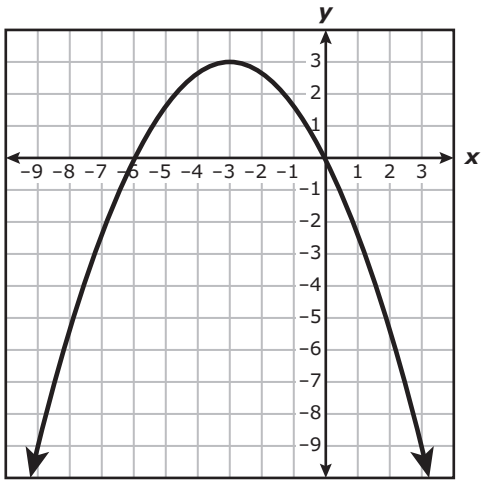

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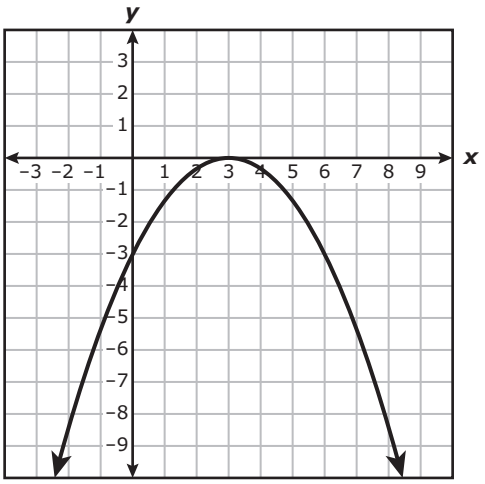


GO ON

8 Which expression is equivalent to $(x^9yz^4)^5$?

F $x^{14}y^6z^9$

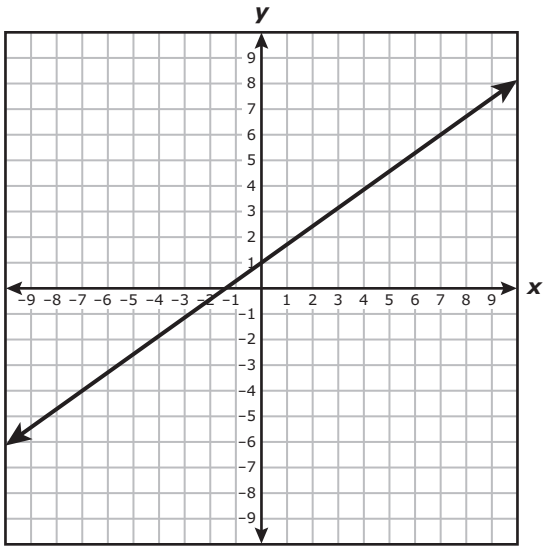
G $x^{14}y^5z^9$

H $x^{45}yz^{20}$

J $x^{45}y^5z^{20}$

---

9 The graph of linear function g passes through the points $(-7, -4)$ and $(7, 6)$, as shown.



What are the slope and y-intercept of the graph of g?

A The slope is $\frac{5}{7}$, and the y-intercept is -1.

B The slope is $\frac{5}{7}$, and the y-intercept is 1.

C The slope is $\frac{7}{5}$, and the y-intercept is -1.

D The slope is $\frac{7}{5}$, and the y-intercept is 1.

10 What is the solution to $4(y - 3) + 19 = 8(2y + 3) + 7$?

F $-\frac{1}{2}$

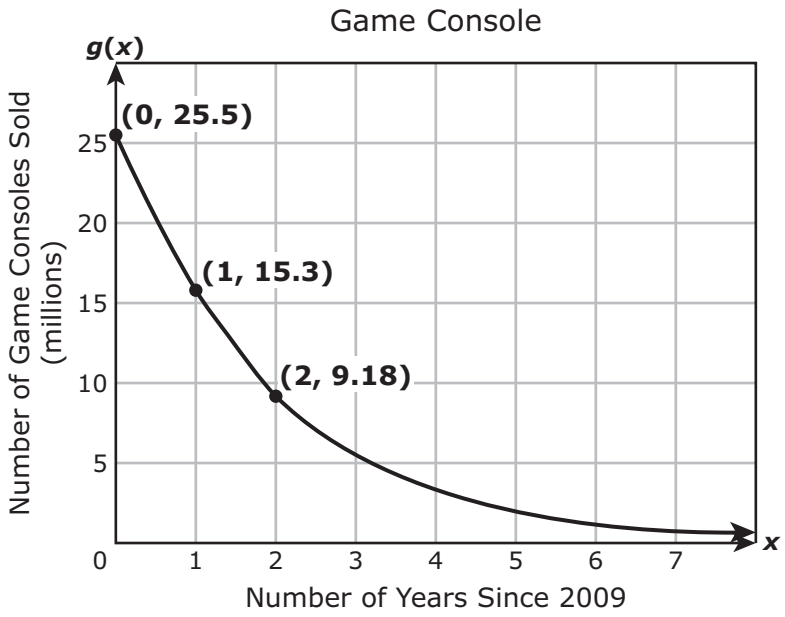
G $\frac{1}{2}$

H -2

J 2

---

11 The graph shows the number of game consoles sold in millions since 2009.



Based on this information, which function best models the number of game consoles sold in millions x years since 2009?

A $g(x) = 0.6(25.5)^x$

B $g(x) = 25.5(0.6)^x$

C $g(x) = 6.12(25.5)^x$

D $g(x) = 25.5(6.12)^x$

12 A ball is placed in a machine that throws the ball up in the air. The table represents some points on the graph of a function that models the ball's distance from the ground with respect to the time since the ball has been thrown.

Ball

Time Since Thrown from Machine (seconds)	0	0.25	0.50	0.75	1.00	1.25	1.50	1.75
Distance from Ground (meters)	0	2.76	4.90	6.43	7.35	7.66	7.35	6.43

What is the range for this situation?

F All real numbers less than or equal to 7.66

G All real numbers less than or equal to 1.25

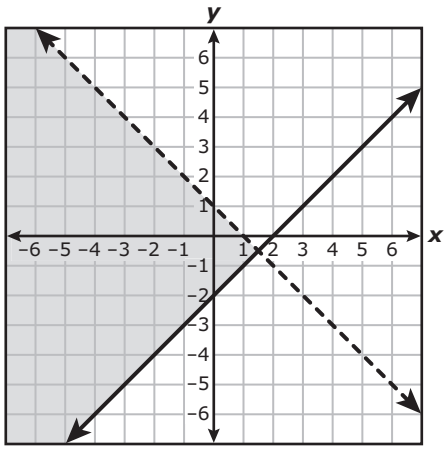
H All real numbers greater than or equal to 0 and less than or equal to 7.66

J All real numbers greater than or equal to 0 and less than or equal to 1.25

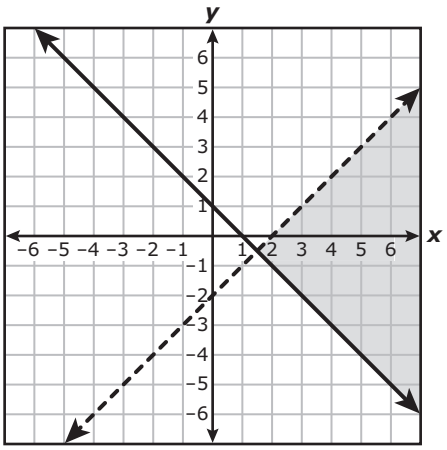
13 Which graph best represents the solution set to this system of inequalities?

$$x + y < 1$$
$$x - y \leq 2$$

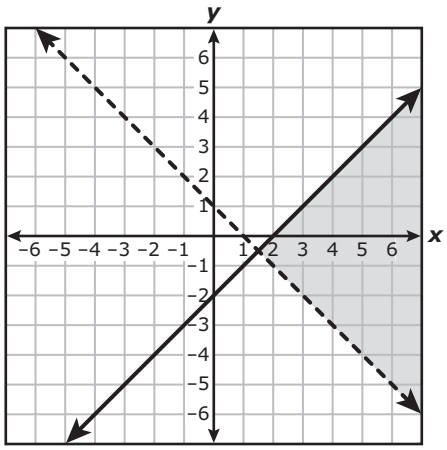
A



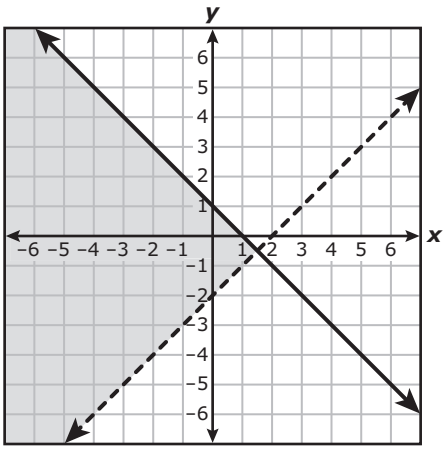
C



B



D



GO ON

14 Given $p(x) = -4(x - 15)^2 + 2$, what is the value of $p(7)$?

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

---

15 A customer paid a total of \$6.00 for 68 copies at a print shop. Some of the copies were black-and-white copies, and the rest were color copies.

- Each black-and-white copy cost \$0.08.
- Each color copy cost \$0.15.

Which system of equations can be used to find b, the number of black-and-white copies, and c, the number of color copies that the customer paid for at the print shop?

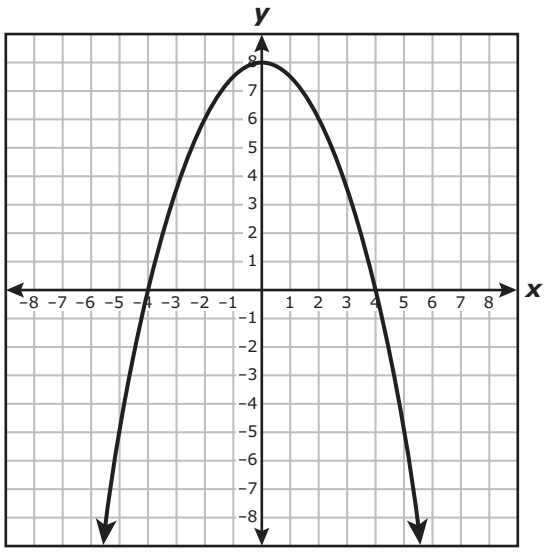
A $b + c = 6.00$
$0.08b + 0.15c = 68$

B $b + c = 68$
$0.15b + 0.08c = 6.00$

C $b + c = 6.00$
$0.15b + 0.08c = 68$

D $b + c = 68$
$0.08b + 0.15c = 6.00$

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



Which function is best represented by this graph?

F $f(x) = -\frac{1}{2}x^2 + 16$

G $f(x) = -x^2 + 16$

H $f(x) = -\frac{1}{2}x^2 + 8$

J $f(x) = -x^2 + 8$

17 The table of values shows a linear relationship between x and y.

x	y
−7	9
−2	1
3	−7
8	−15

What is the slope of the line represented by the table of values?

A $-\frac{8}{5}$

B $-\frac{5}{8}$

C $\frac{8}{5}$

D $\frac{5}{8}$

---

18 Which expression is a factored form of $2x^2 - 25x + 63$?

F $(x + 9)(2x + 7)$

G $(x - 9)(2x - 7)$

H $(x + 7)(2x + 9)$

J $(x - 7)(2x - 9)$

19 What is the equation in standard form of the line that passes through the point $(6, -1)$ and is parallel to the line represented by $8x + 3y = 15$?

A $8x + 3y = -45$

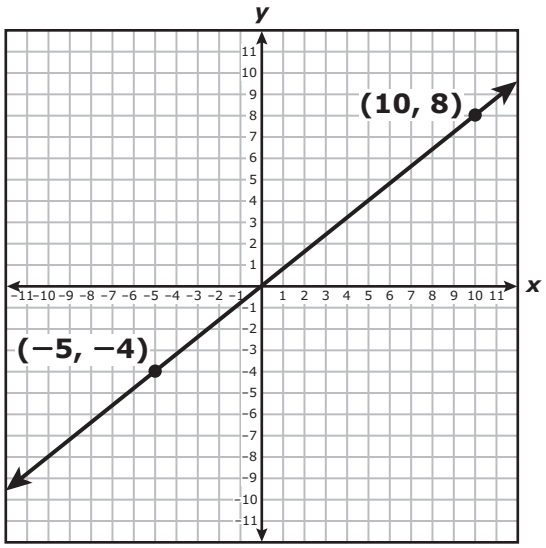
B $8x - 3y = -51$

C $8x + 3y = 45$

D $8x - 3y = 51$

---

20 The graph of linear function h is shown on the grid.



Given $f(x) = x$ and $h(x) = af(x)$, what is the value of a?

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

GO ON

21 A conservation agency tracks the sea turtle population by counting the number of nesting sites where the turtles lay their eggs. The table shows the numbers of nesting sites for several years since 2001. The data can be modeled by an exponential function.

Sea Turtles

Number of Years Since 2001, x	Number of Nesting Sites, $n(x)$
1	46,125
2	37,994
3	40,513
4	29,368
5	34,082
6	31,746
7	27,691

Which function best models the data?

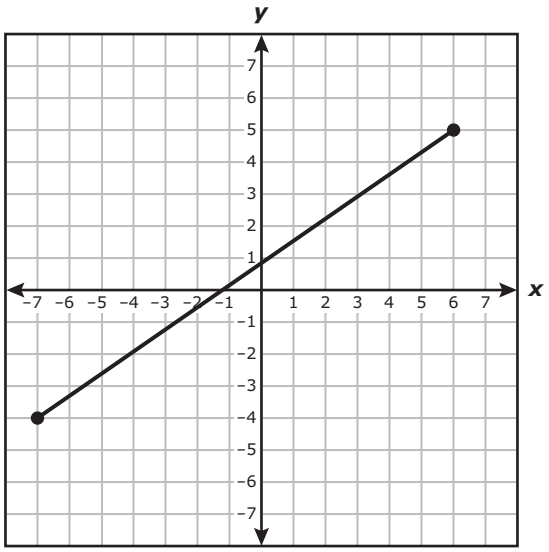
A $n(x) = 25{,}956.80(1.08)^x$

B $n(x) = 46{,}797.94(0.93)^x$

C $n(x) = 1.08(25{,}956.80)^x$

D $n(x) = 0.93(46{,}797.94)^x$

22 A part of linear function g is graphed on the grid.



Which inequalities best describe the domain and range of the part shown?

F Domain: $-4 < x < 5$
Range: $-7 < g(x) < 6$

G Domain: $-7 < x < 6$
Range: $-4 < g(x) < 5$

H Domain: $-4 \leq x \leq 5$
Range: $-7 \leq g(x) \leq 6$

J Domain: $-7 \leq x \leq 6$
Range: $-4 \leq g(x) \leq 5$

GO ON

23 Which value of x is a solution to this equation?

$$3x^2 - 30x - 72 = 0$$

A $x = -12$

B $x = -4$

C $x = -2$

D $x = -6$

GO ON

24 The tables of ordered pairs represent some points on the graphs of lines f and g.

Line f

x	y
2	7
4	10.5
7	15.75
11	22.75

Line g

x	y
−3	4
−2	0
1	−12
4	−24

Which system of equations represents lines f and g?

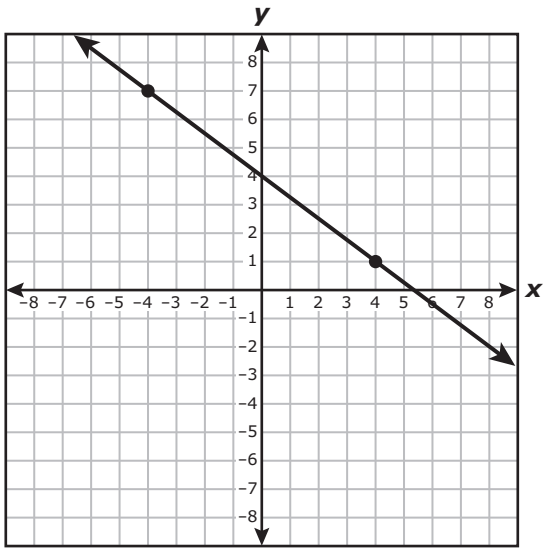
F $y = 1.75x + 3.5$
$y = -4x - 8$

G $y = 1.75x + 3.5$
$y = -4x - 2$

H $y = 3.5x + 1.75$
$y = -4x - 8$

J $y = 3.5x + 1.75$
$y = -4x - 2$

25 The graph of a linear function is shown on the grid.



What is the rate of change of y with respect to x for this function?

A $\frac{7}{9}$

B $-\frac{7}{9}$

C $\frac{3}{4}$

D $-\frac{3}{4}$

---

26 Which expression is equivalent to $\frac{36x^4y^5}{(3xy)^2}$ for all values of x and y where the expression is defined?

F $12x^3y^4$

G $27x^2y^3$

H $4x^2y^3$

J $6x^3y^4$

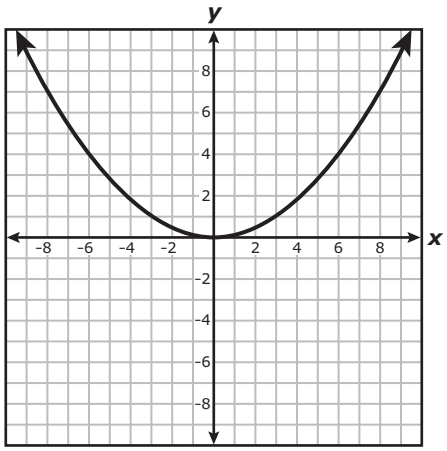
27 What is the value of the y-intercept of the graph of $g(x) = 73\left(\frac{4}{5}\right)^x$?

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

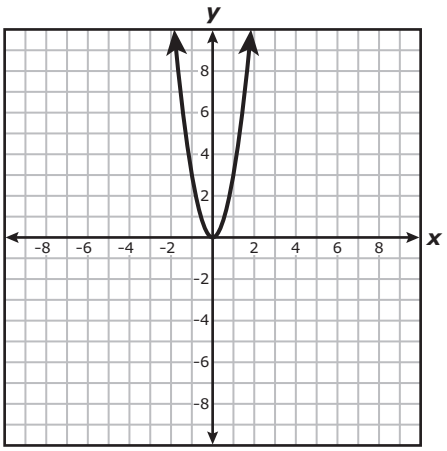
GO ON

28 The graph of $f(x) = x^2$ is reflected over the x-axis and is stretched horizontally to create the graph of function g. Which graph could represent g?

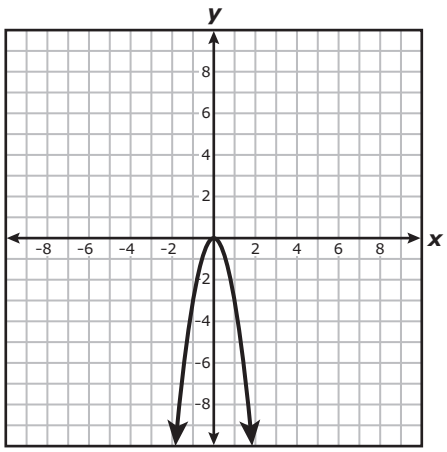
F



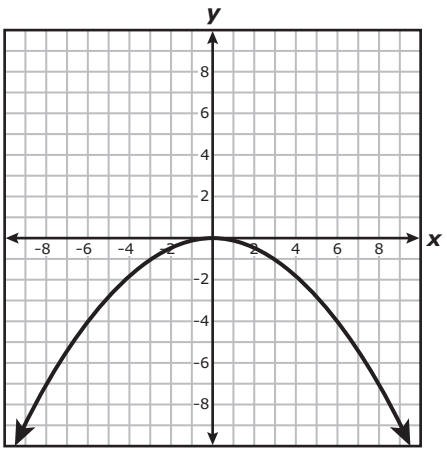
H



G



J



GO ON

29 Which expression is equivalent to $\left(\frac{3}{2}p + 1\right)\left(\frac{1}{2}p + 3\right)$?

A $2p^2 + 3$

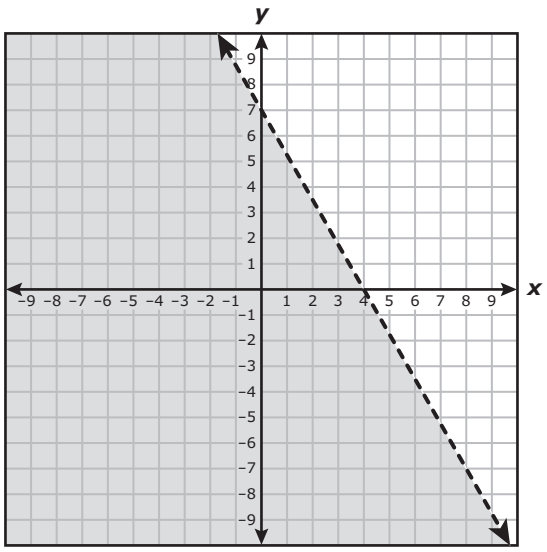
B $4p^2 + 3$

C $\frac{3}{4}p^2 + 5p + 3$

D $\frac{3}{4}p^2 + 10p + 3$

---

30 Which inequality is best represented by the graph?



F $4x + 7y \leq 49$

G $4x + 7y < 49$

H $7x + 4y \leq 28$

J $7x + 4y < 28$

31 Which situation best shows causation?

A The length of a rectangle affects the width of the rectangle.

B The amount of time a cell phone is used affects the charge of its battery.

C The number of ice-cream bars sold affects the number of milkshakes sold.

D The number of soccerballs a team owns affects the number of games the team wins during the soccer season.

GO ON

32 Which expression is equivalent to $16w^2 + 24w + 9$?

F $(4w + 3)^2$

G $(4w - 3)^2$

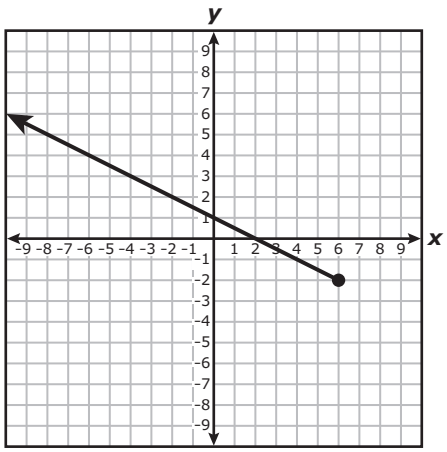
H $(8w + 3)^2$

J $(8w - 3)^2$

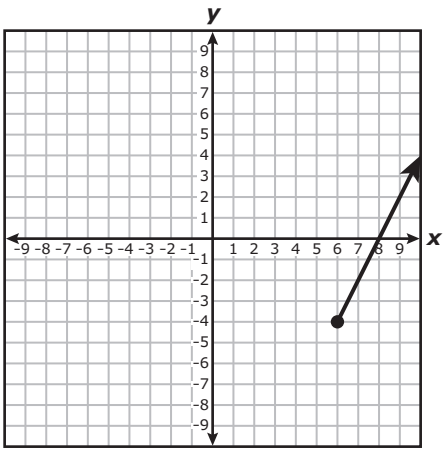
---

33 Which graph best represents a function with a domain of all real numbers less than or equal to 6?

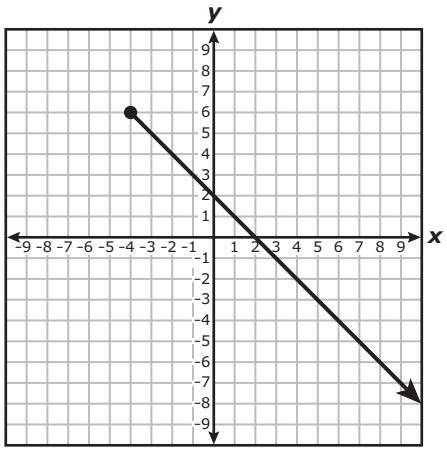
A



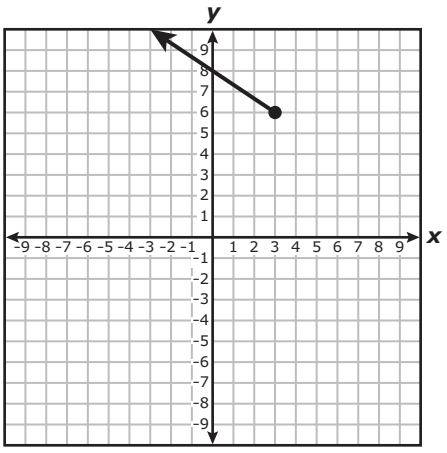
C



B

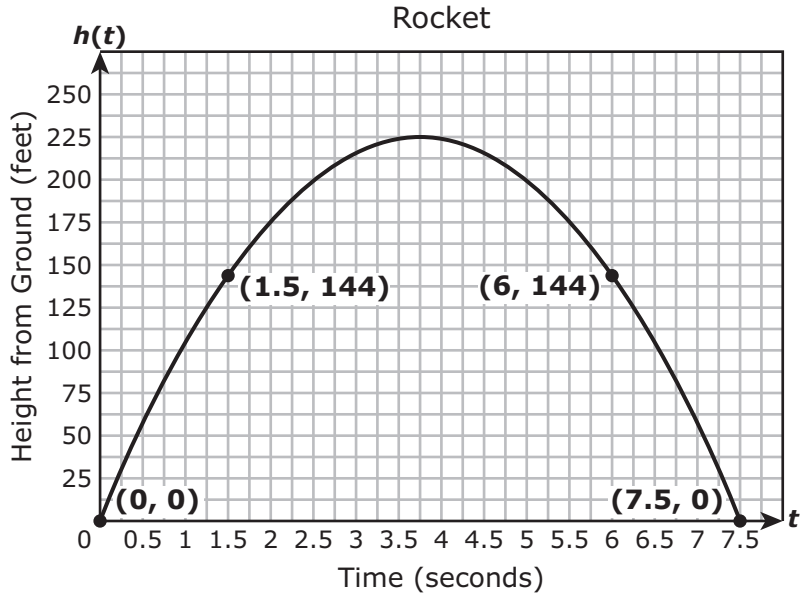


D



GO ON

34 Quadratic function h can be used to model the height in feet of a rocket from the ground t seconds after it was launched. The graph of the function is shown.



What is the maximum value of the graph of the function?

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

---

35 Which expression is equivalent to $(15a^0b^2c^{34})(3a^{16}b^{-29}c^0)$ for all values of a, b, and c where the expression is defined?

A $\frac{18}{b^{58}}$

B $\frac{45}{b^{58}}$

C $\frac{18a^{16}c^{34}}{b^{27}}$

D $\frac{45a^{16}c^{34}}{b^{27}}$

36 A contractor's total earnings from a job include a fixed amount plus an amount based on the number of hours worked. The values in the table represent the linear relationship between the number of hours worked and the contractor's total earnings in dollars.

Contractor

Number of Hours Worked	Total Earnings
0	$20.00
5	$63.75
15	$151.25
25	$238.75
35	$326.25
40	$370.00

What is the rate of change of the contractor's total earnings in dollars with respect to the number of hours worked?

F $8.75 per hour worked

G $9.25 per hour worked

H $10.00 per hour worked

J $20.00 per hour worked

---

37 What is the solution set for $2x^2 + 15 = -11x$?

A $\{-5, -1.5\}$

B $\{2.5, 3\}$

C $\{1.5, 5\}$

D $\{-3, -2.5\}$

38 The table represents some points on the graph of an exponential function.

x	$f(x)$
2	36
3	54
4	81
5	121.5
6	182.25

Which function represents this relationship?

F $f(x) = 16\left(\frac{3}{2}\right)^x$

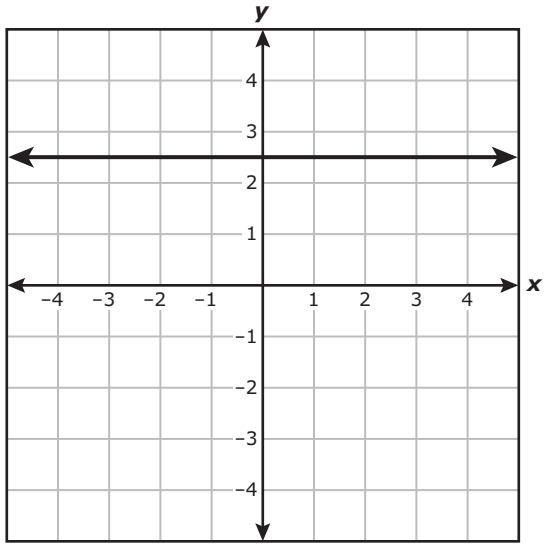
G $f(x) = 16\left(\frac{2}{3}\right)^x$

H $f(x) = 36\left(\frac{3}{2}\right)^x$

J $f(x) = 36\left(\frac{2}{3}\right)^x$

GO ON

39 Which statement best represents the equation of the line shown on the grid and its relationship to the x-axis?



A The equation of the line is $x = 2.5$, and the line is parallel to the x-axis.

B The equation of the line is $x = 2.5$, and the line is perpendicular to the x-axis.

C The equation of the line is $y = 2.5$, and the line is parallel to the x-axis.

D The equation of the line is $y = 2.5$, and the line is perpendicular to the x-axis.

---

40 Which expression is equivalent to $9n^2 - 25$?

F $(3n - 5)^2$

G $(3n + 5)(3n - 5)$

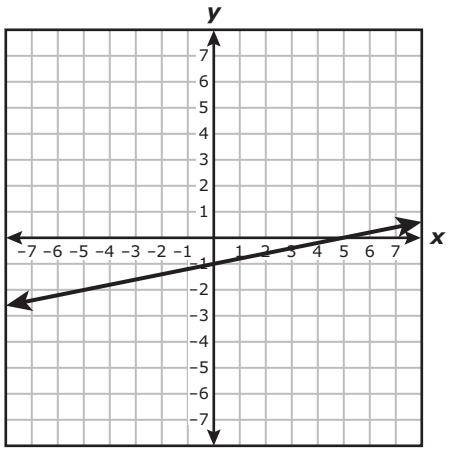
H $9(n - 4)^2$

J $9(n + 4)(n - 4)$

GO ON

41 Linear function t has an x-intercept of -1 and a y-intercept of 5. Which graph best represents t?

A



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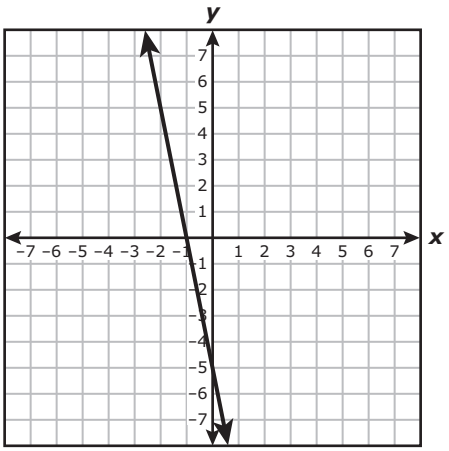
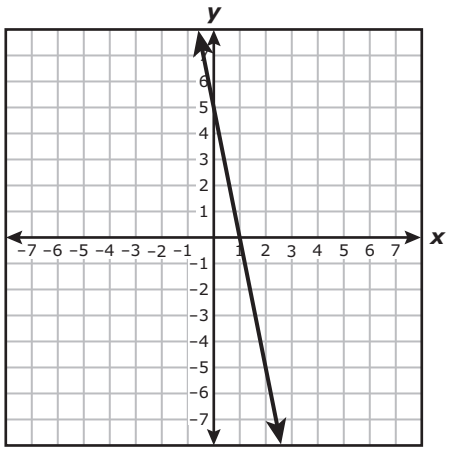
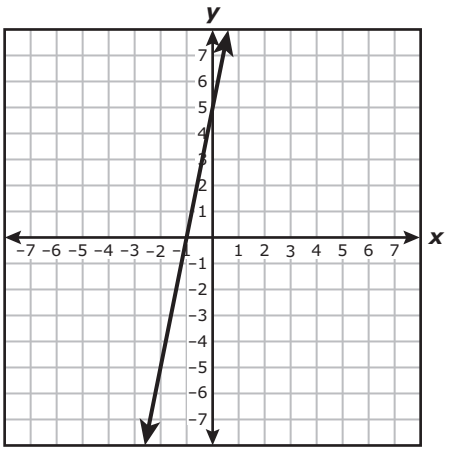


B



D



GO ON

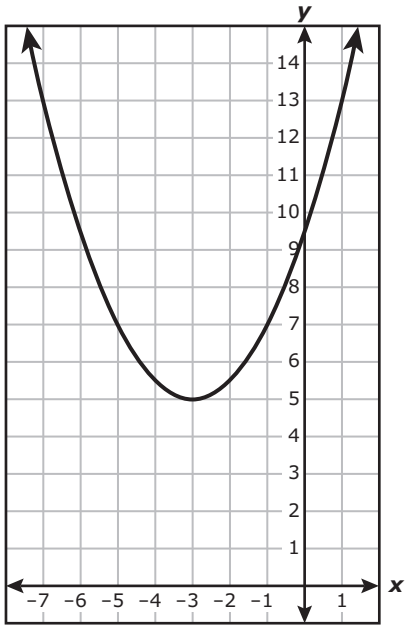
42 The value of y is directly proportional to the value of x. When $x = 3.5$, the value of y is 14.

What is the value of y when $x = 28$?

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

GO ON

43 A quadratic function is graphed on the grid.



Which answer choice best represents the domain and range of the function?

A Domain: $x \geq -3$
Range: $y \geq 5$

B Domain: All real numbers
Range: $y \geq 5$

C Domain: $x \geq -3$
Range: All real numbers

D Domain: $y \geq 5$
Range: $x \geq -3$

44 The table represents some points on the graph of linear function f.

x	−3	2	5	11
$f(x)$	−130	0	78	234

Which function represents f ?

F $f(x) = 26(x - 2)$

G $f(x) = -26(2x - 1)$

H $f(x) = 13(x - 2)$

J $f(x) = -2(26x - 1)$

---

45 Which expression is equivalent to $x^2 + 10x + 24$?

A $(x + 1)(x + 24)$

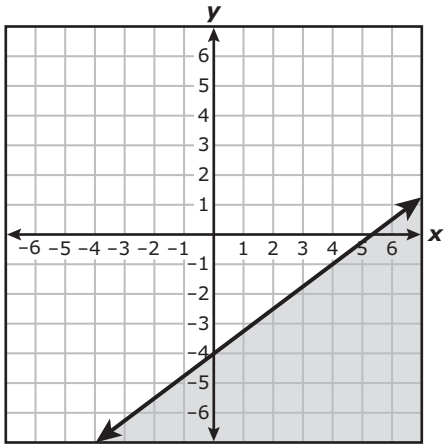
B $(x + 2)(x + 12)$

C $(x + 3)(x + 8)$

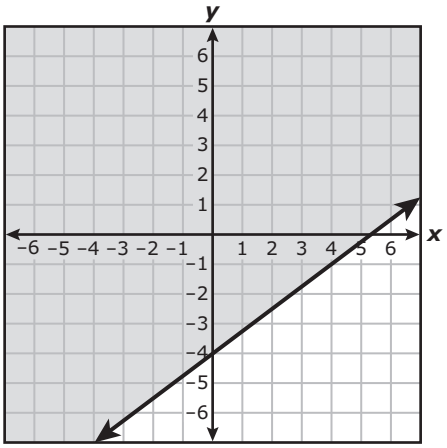
D $(x + 4)(x + 6)$

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

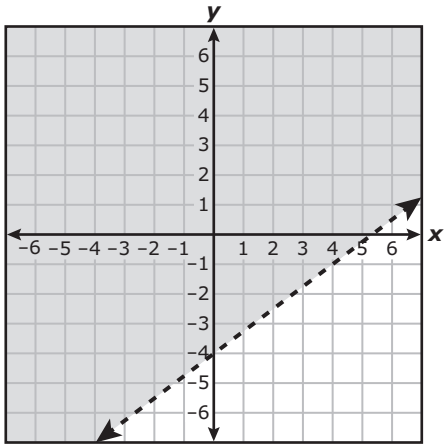
F



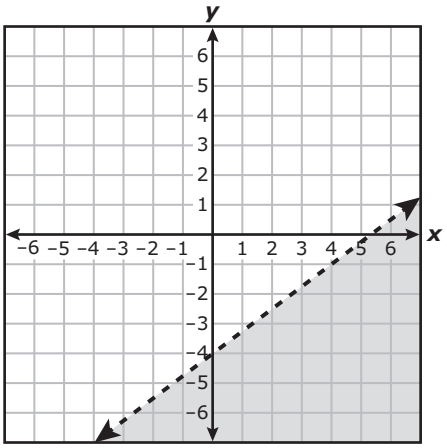
H



G

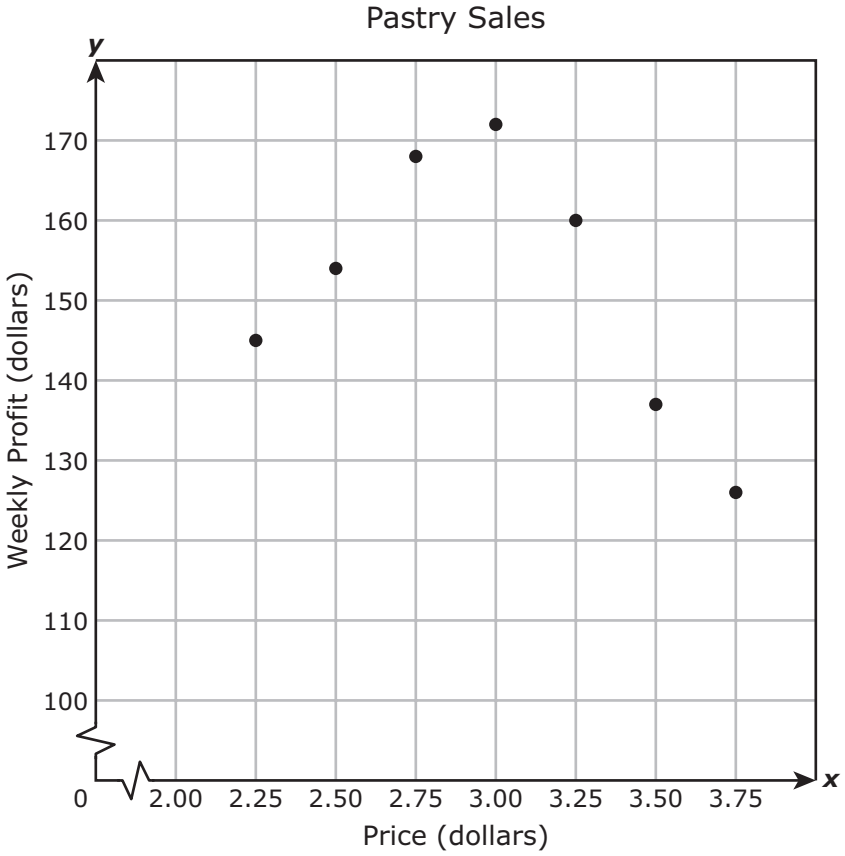


J



GO ON

47 The scatterplot and table show the weekly profit in dollars earned from the sale of pastries at seven different prices. The data can be modeled by a quadratic function.



x	y
2.25	145
2.50	154
2.75	168
3.00	172
3.25	160
3.50	137
3.75	126

Which function best models the data?

A $y = 0.001x^2 - 0.426x + 35.672$

B $y = -60.4x^2 + 348.1x - 334.2$

C $y = 0.001x^2 + 35.672$

D $y = -60.4x^2 - 334.2$

---

48 Which expression is equivalent to $35m^2 - 63$?

F $7(5m^2 - 9)$

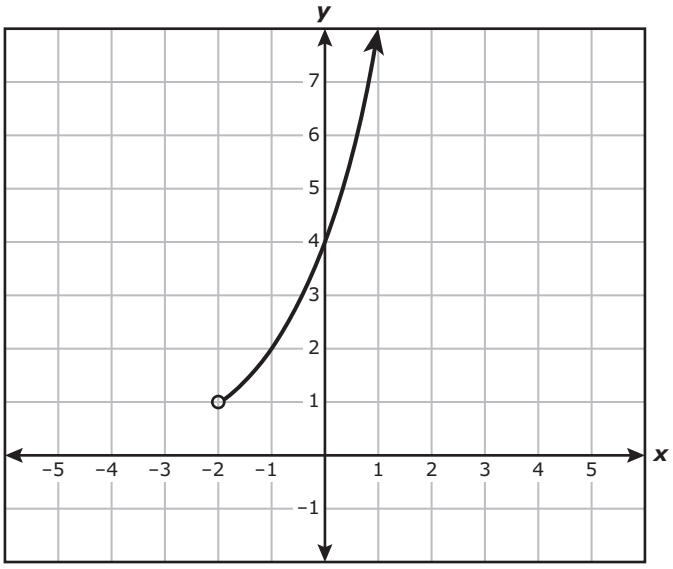
G $-7(5m^2+9)$

H $7m(5m - 9)$

J $-7m(5m + 9)$

GO ON

49 A part of exponential function f is graphed on the grid.



Which inequality best represents the domain of the part shown?

A $x > 1$

B $y > 1$

C $x > -2$

D $y > -2$

---

50 What is the value of y in the solution to this system of equations?

$$6y + x = -59$$
$$x = -2y + 9$$

F 8.5

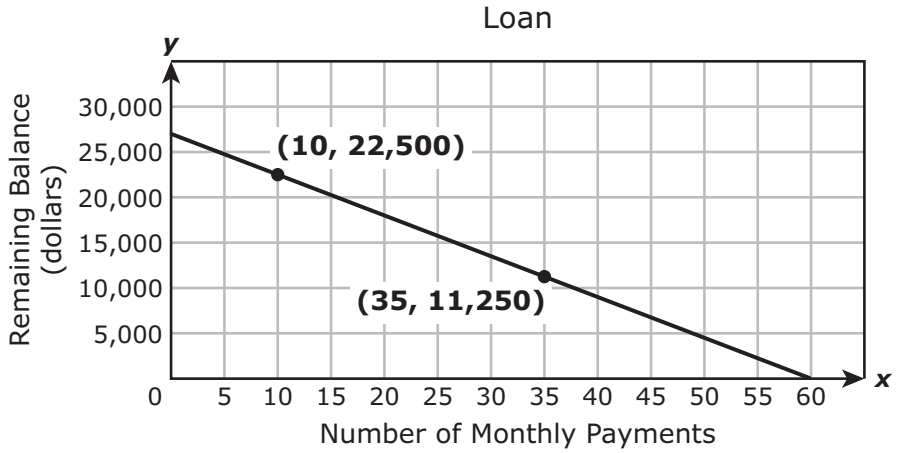
G −17

H 43

J −12.5

GO ON

51 The graph models the linear relationship between the number of monthly payments made on a loan and the remaining balance in dollars left to pay on the loan.



Which statement describes the x-intercept of the graph?

A The x-intercept is 60, which represents the initial balance in dollars of the loan.

B The x-intercept is 27,000, which represents the initial balance in dollars of the loan.

C The x-intercept is 60, which represents the number of monthly payments needed to repay the loan.

D The x-intercept is 27,000, which represents the number of monthly payments needed to repay the loan.

---

52 The graph of $f(x) = x^2$ was translated 4.5 units to the left to create the graph of function g. Which function represents g?

F $g(x) = (x - 4.5)^2$

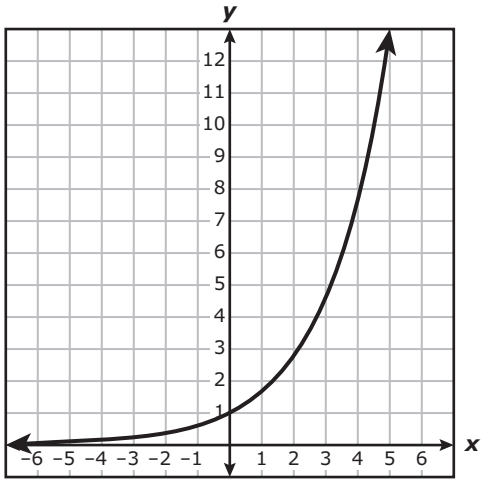
G $g(x) = (x + 4.5)^2$

H $g(x) = x^2 - 4.5$

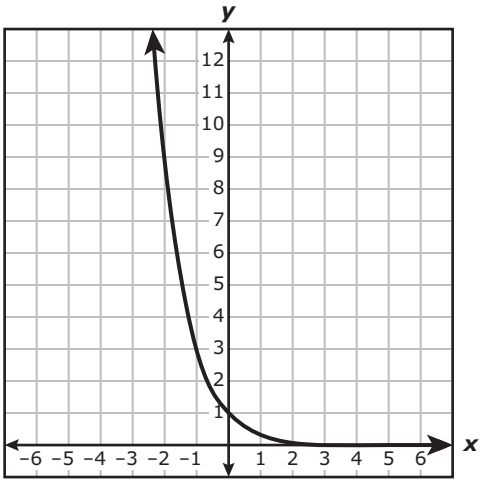
J $g(x) = x^2 + 4.5$

53 Which graph best represents $y = 5\left(\frac{1}{3}\right)^x$?

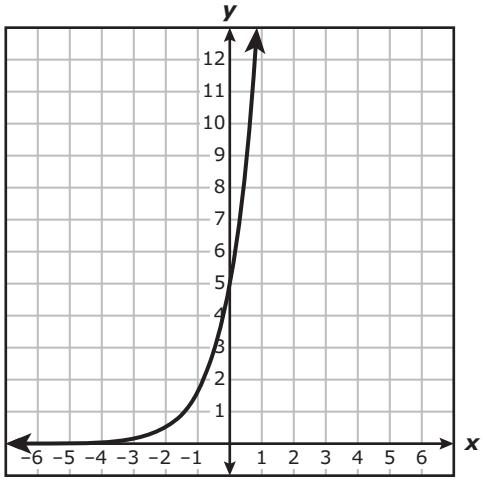
A



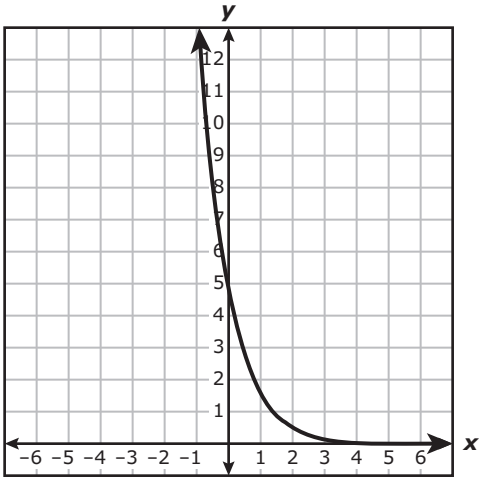
C



B



D



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54 What is the solution to this equation?

$$-4(2m - 7) = 3(52 - 4m)$$

F 32

G 46

H −6.4

J −40.75

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

STOP

STAAR
Algebra I
May 2021