

# 2016 TEXAS STAAR TEST – END OF COURSE – ALGEBRA I

Total Possible Score: 54  
Needed Correct to Pass: For 2016 - 21 For 2017 - 23  
Advanced Performance: 42

Time Limit: 4 Hours

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The number of correct answers required to "pass" this test is shown above. Because of where the "passing" score is set, it may be possible to pass the test without learning some important areas of study. Because of this, I believe that making the passing grade should not be considered "good enough." A student's goal should be to master each of the objectives covered by the test. The "Advanced Performance" score is a good goal for mastery of all the objectives.

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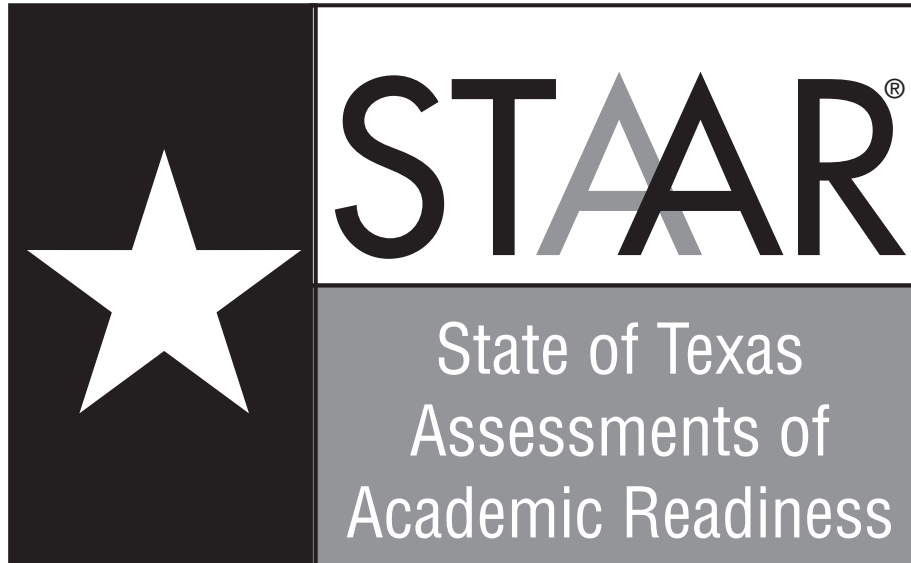
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# **Algebra I**

**Administered May 2016**

**RELEASED**



# STAAR ALGEBRA I REFERENCE MATERIALS



## 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

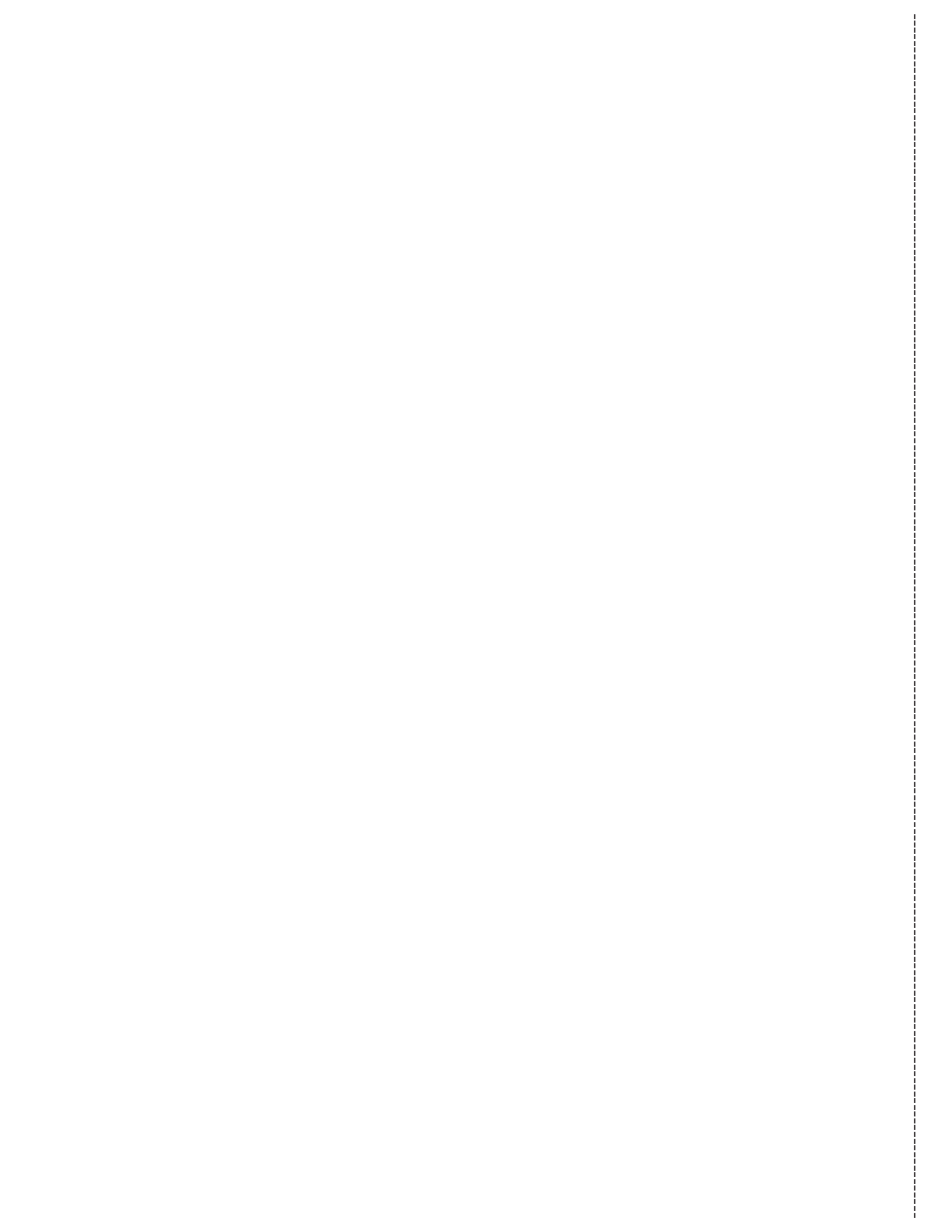
$$f(x) = a(x - h)^2 + k$$

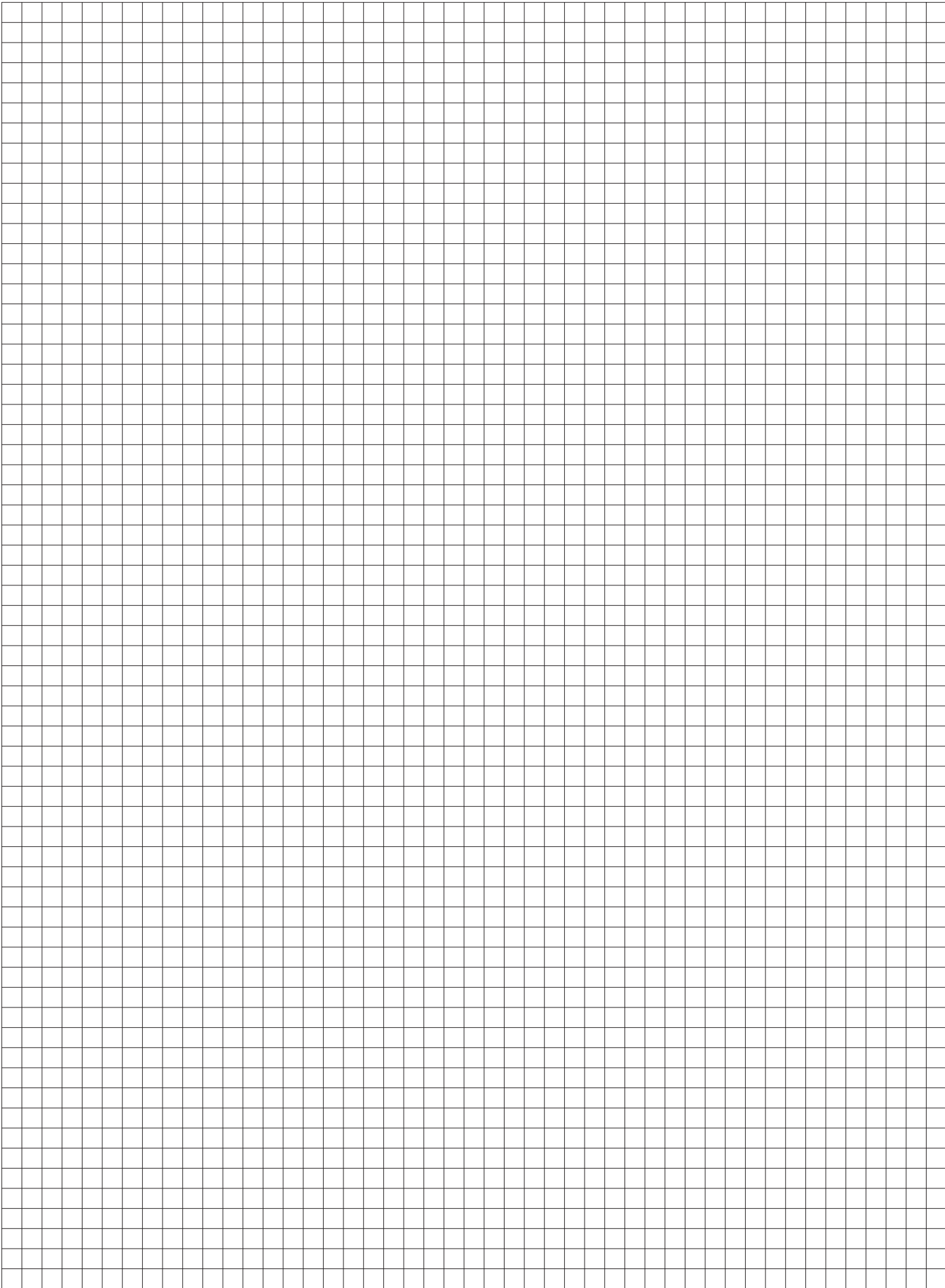
Quadratic formula

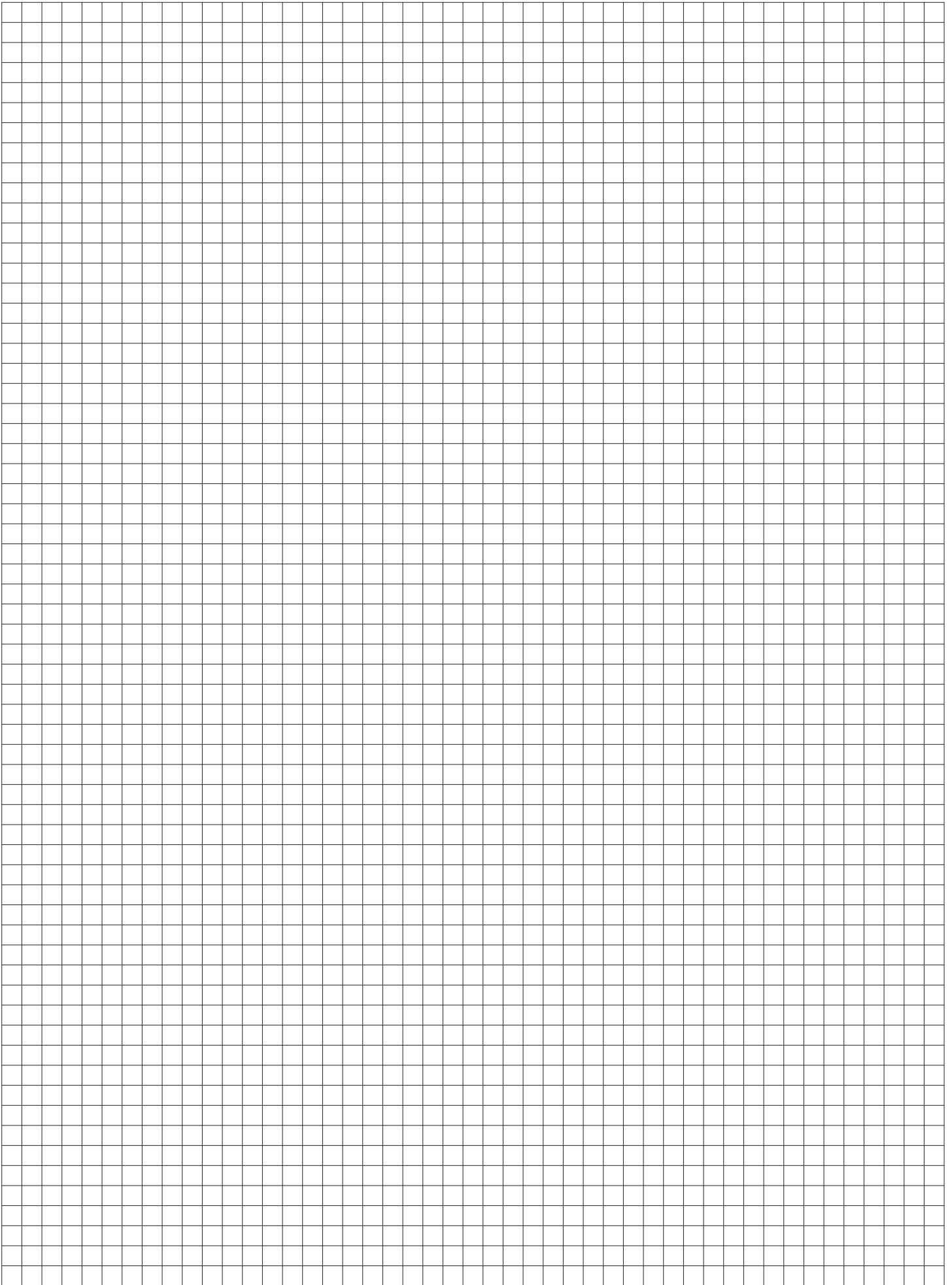
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Axis of symmetry

$$x = \frac{-b}{2a}$$







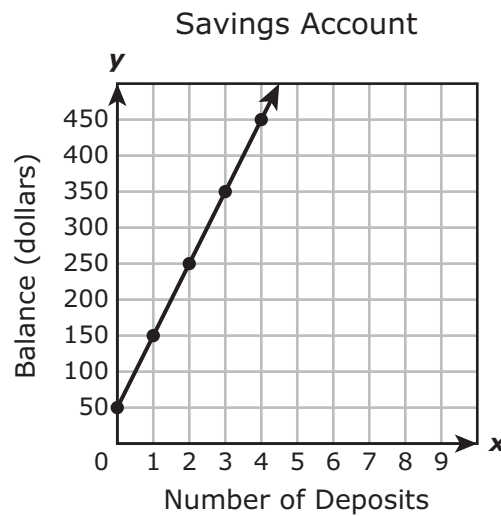
# ALGEBRA I



## 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 A savings account balance can be modeled by the graph of the linear function shown on the grid.



What is the rate of change of the balance with respect to the number of deposits?

- A \$100 per deposit
- B \$50 per deposit
- C \$0.50 per deposit
- D \$2 per deposit

2 Which expression is equivalent to  $2x^2 + (4x - 6x^2) + 9 - (6x + 3)$ ?

F  $-4x^2 - 2x + 12$

G  $-4x^2 - 2x + 6$

H  $-10x + 6$

J  $18x + 12$

---

3 Baseball fans can buy tickets for seats in the lower deck or upper deck of the stadium. Tickets for the lower deck cost \$42 each. Ticket prices for the upper deck are 75% of the cost of tickets for the lower deck. Which inequality represents all possible combinations of  $x$ , the number of tickets for the lower deck, and  $y$ , the number of tickets for the upper deck, that someone can buy for no more than \$800?

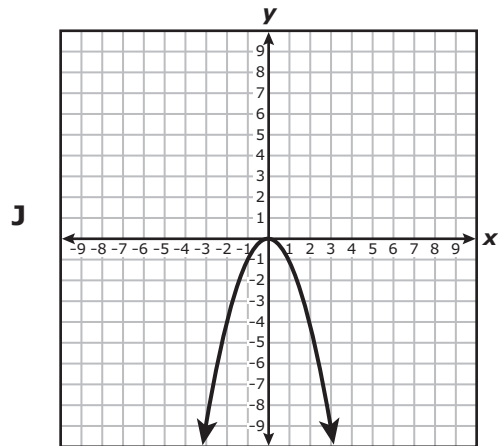
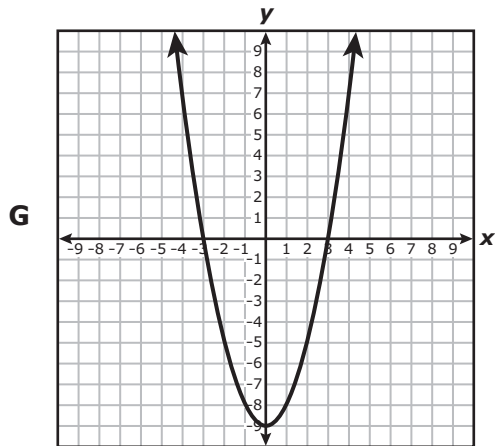
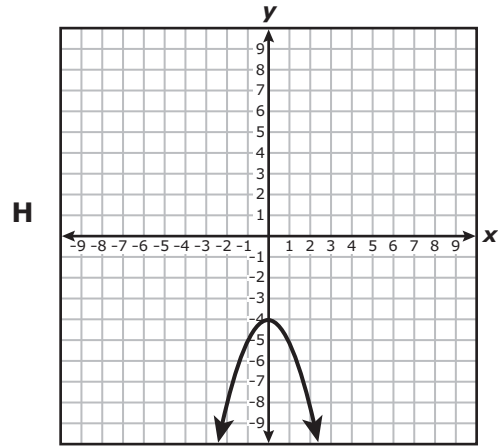
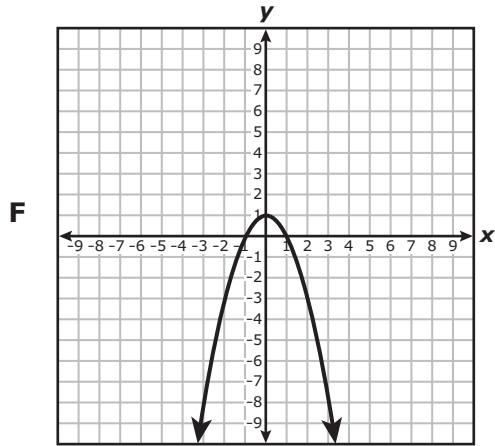
A  $42x + 56y \leq 800$

B  $42x + 31.5y \leq 800$

C  $42x + 56y > 800$

D  $42x + 31.5y > 800$

- 4 Function  $p$  is in the form  $y = ax^2 + c$ . If the values of  $a$  and  $c$  are both less than 0, which graph could represent  $p$ ?



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

<b>x</b>	-7.5	-3.5	-1	2	3.5
<b>y</b>	12	0	-7.5	-16.5	-21

Which function represents the same relationship?

**A**  $h(x) = -3x - 10.5$

**B**  $h(x) = -x - 3.5$

**C**  $h(x) = 3x - 10.5$

**D**  $h(x) = x - 3.5$

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6 Which expression is equivalent to  $2x^2 + 7x + 4$ ?

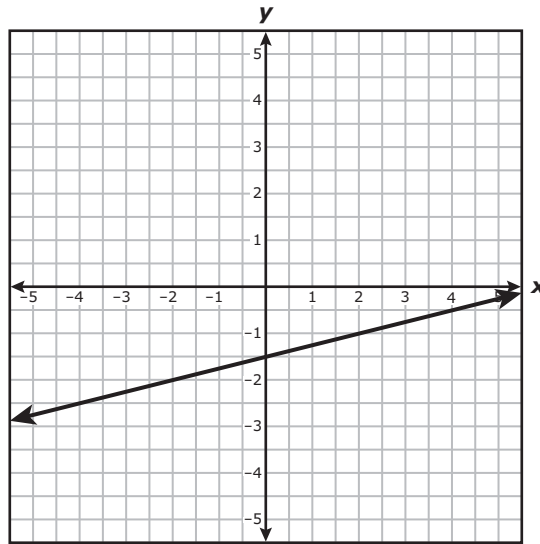
**F**  $(2x - 1)(x + 4)$

**G**  $(2x + 1)(x - 4)$

**H**  $(2x + 1)(x + 4)$

**J** None of these

7 The graph of  $0.5x - 2y = 3$  is shown on the grid.



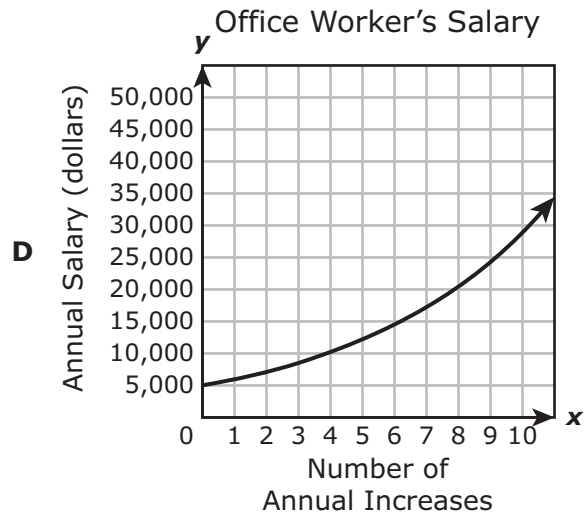
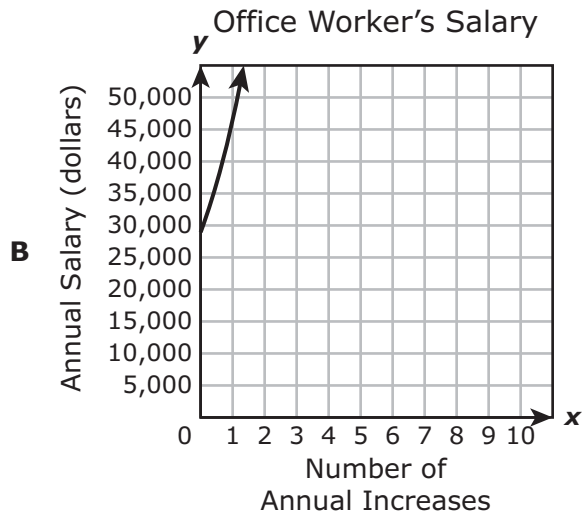
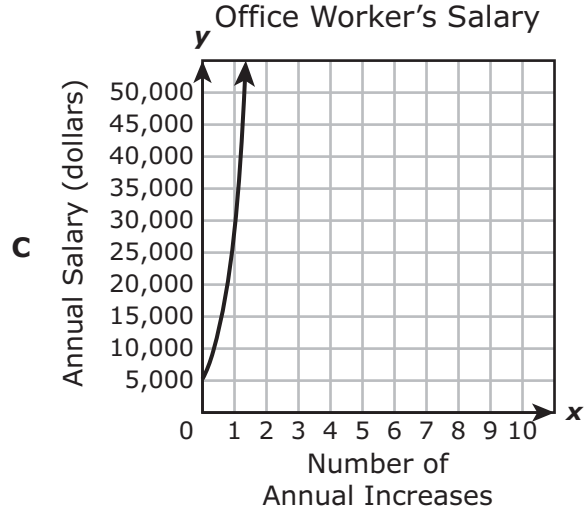
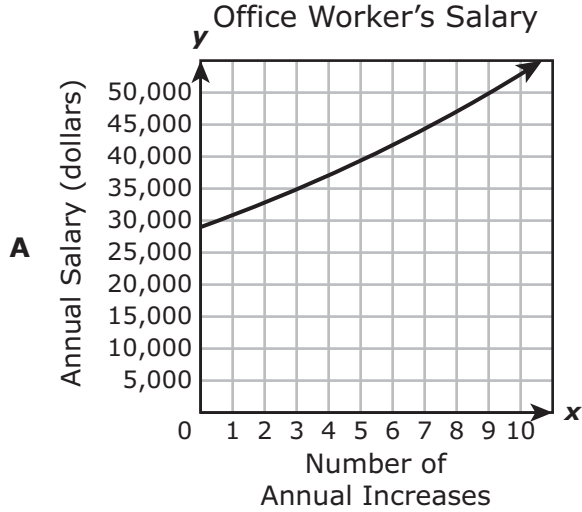
Which ordered pair is in the solution set of  $0.5x - 2y \geq 3$ ?

- A  $(-2, 0.5)$
  - B  $(2, 1)$
  - C  $(2, -1)$
  - D  $(-2, -0.5)$
- 

8 What value of  $x$  makes the equation  $-5x - (-7 - 4x) = -2(3x - 4)$  true?

- F  $x = 3$
- G  $x = 5$
- H  $x = \frac{1}{3}$
- J  $x = \frac{1}{5}$

- 9 The starting annual salary for an office worker at a company is \$29,000. If the company awards an annual increase of 6.2%, which graph models this situation after the office worker receives  $x$  annual increases?



10 Which expression is equivalent to  $\frac{14a^4b^6c^{-10}}{8a^{-2}b^3c^{-5}}$ ?

F  $\frac{7a^2b^3}{4c^{15}}$

G  $\frac{6a^2b^9}{c^{15}}$

H  $\frac{7a^6b^3}{4c^5}$

J  $\frac{7b^2c^2}{4a^2}$

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11 Linear function  $f(x) = x$  is graphed on a coordinate plane. The graph of a new line is formed by changing the slope of the original line to  $\frac{2}{3}$  and the  $y$ -intercept to 4. Which statement about the relationship between these two graphs is true?

- A The graph of the new line is steeper than the graph of the original line, and the  $y$ -intercept has been translated down.
- B The graph of the new line is less steep than the graph of the original line, and the  $y$ -intercept has been translated up.
- C The graph of the new line is steeper than the graph of the original line, and the  $y$ -intercept has been translated up.
- D The graph of the new line is less steep than the graph of the original line, and the  $y$ -intercept has been translated down.

- 12 The table shows some ordered pairs that belong to quadratic function  $h$ .

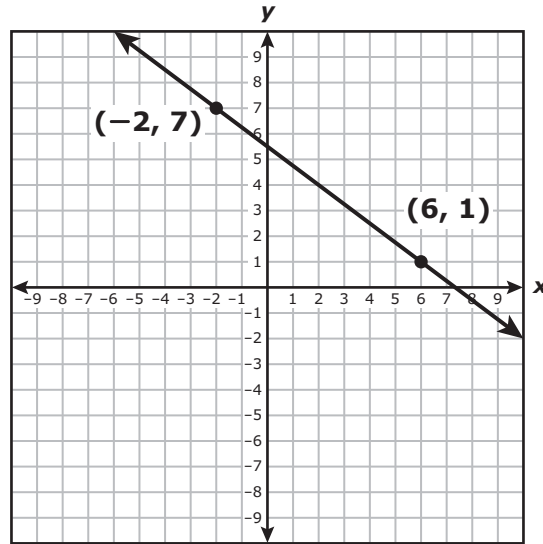
$x$	-4	-2	0	2	3	4	6
$h(x)$	41	17	1	-7	-8	-7	1

What is the range of  $h$ ?

- F** All real numbers
- G** All real numbers greater than or equal to  $-7$
- H** All real numbers greater than or equal to  $-8$
- J** All real numbers greater than or equal to 0
- 
- 13 A sports magazine prints 12 issues per year, and a technology magazine prints 10 issues per year. The total number of pages in all the issues of the sports magazine for one year is 32 more than the total number of pages in all the issues of the technology magazine for one year. Each issue of the sports magazine has 18 fewer pages than each issue of the technology magazine. Which system of equations can be used to find  $s$ , the number of pages in each issue of the sports magazine, and  $t$ , the number of pages in each issue of the technology magazine?
- A**  $s = t - 18$   
 $12s = 10t + 32$
- B**  $t = s - 18$   
 $10t = 12s + 32$
- C**  $s = t - 18$   
 $10s = 12t + 32$
- D**  $t = s - 18$   
 $12t = 10s + 32$



14 What is the  $y$ -intercept of the line graphed on the grid?



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

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15 Which expression is equivalent to  $9q^2 - \frac{2}{3}(3q - 7) + 5q^2$ ?

A  $9q^2 - \frac{5}{3}q - 3$

B  $9q^2 - 2q - 3$

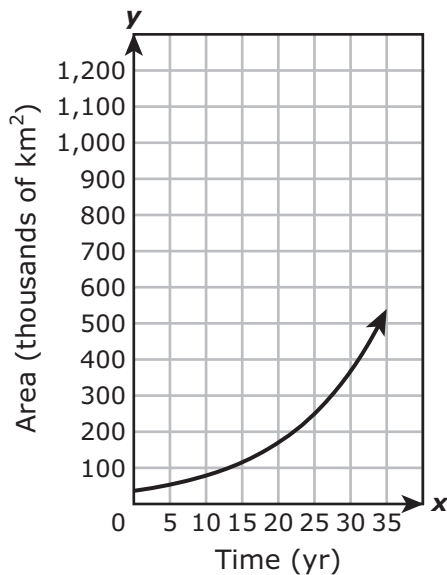
C  $14q^2 - 2q + \frac{14}{3}$

D  $14q^2 - \frac{5}{3}q - \frac{14}{3}$

- 16** Which statement about  $k(x) = -x^2 - 2x + 15$  is true?
- F** The zeros are  $-3$  and  $5$ , because  $k(x) = -(x + 3)(x - 5)$ .
- G** The zeros are  $-5$  and  $3$ , because  $k(x) = -(x + 5)(x - 3)$ .
- H** The zeros are  $-5$  and  $-3$ , because  $k(x) = -(x + 5)(x + 3)$ .
- J** The zeros are  $3$  and  $5$ , because  $k(x) = -(x - 3)(x - 5)$ .

- 17** The exponential function modeled below represents the number of square kilometers of land occupied by cane toads  $x$  years after this animal was first introduced into Australia.

Area Occupied by Cane Toads



Time (yr)	Area (km <sup>2</sup> )
0	36,500
5	53,600
10	78,800
15	115,780
20	170,120
25	250,000
30	367,300
35	539,700

Based on the data, which measurement is closest to the number of square kilometers of land that will be occupied by cane toads 40 years after this animal was first introduced into Australia?

- A** 550,000 km<sup>2</sup>
- B** 1,250,000 km<sup>2</sup>
- C** 600,000 km<sup>2</sup>
- D** 800,000 km<sup>2</sup>

18 Which of the following is equivalent to  $3x - 4y = 6$ ?

F  $y = -\frac{6}{7}x$

G  $y = -\frac{3}{4}x$

H  $y = \frac{4}{3}x + 2$

J  $y = \frac{3}{4}x - \frac{3}{2}$

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

x	y
-2	12
0	3
3	-10.5
7	-28.5

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

A  $\frac{2}{9}$

B  $-\frac{9}{2}$

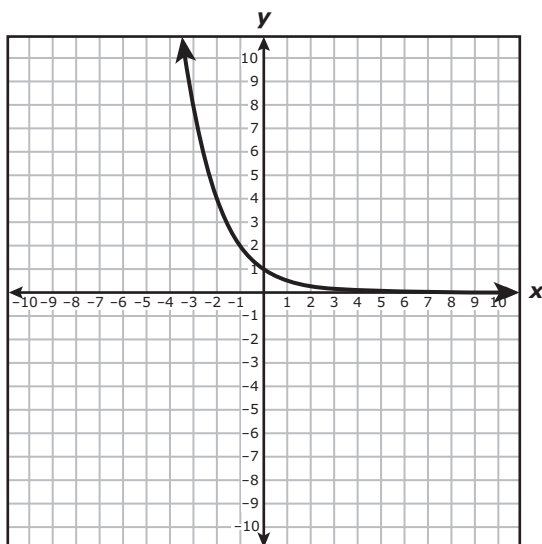
C  $\frac{9}{2}$

D  $-\frac{2}{9}$

- 20** A manager purchased a total of 21 coffee mugs and key chains. Each coffee mug cost \$8.50, and each key chain cost \$2.75. If the manager spent a total of \$132.50, how many coffee mugs did the manager purchase?

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

- 21** The graph of an exponential function is shown on the grid.



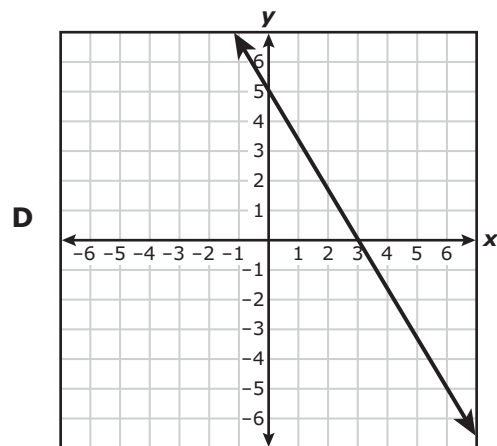
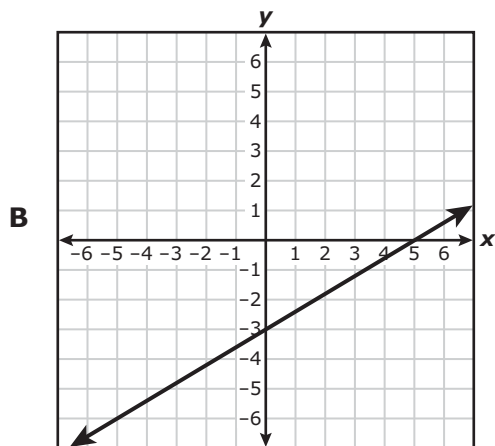
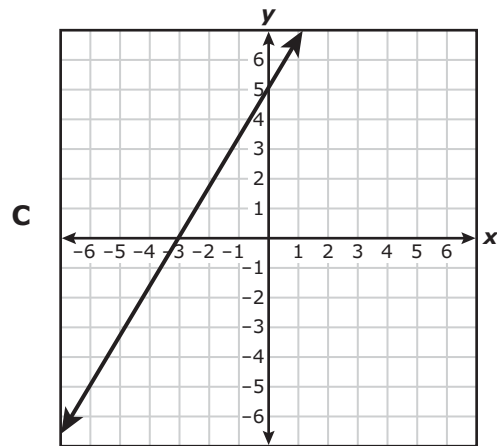
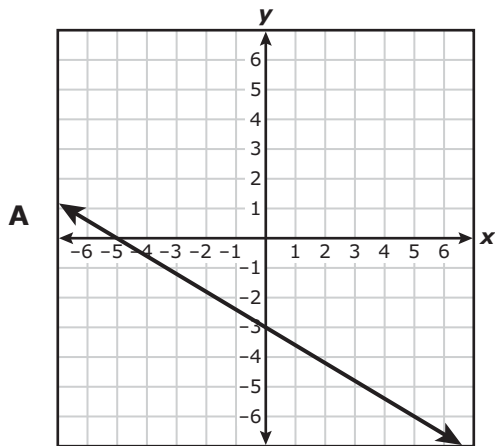
Based on the graph, which statement about the function is true?

- A** The range is the set of all real numbers less than 0.
- B** The domain is the set of all real numbers greater than  $-4$ .
- C** The range is the set of all real numbers greater than 0.
- D** The domain is the set of all real numbers less than  $-4$ .

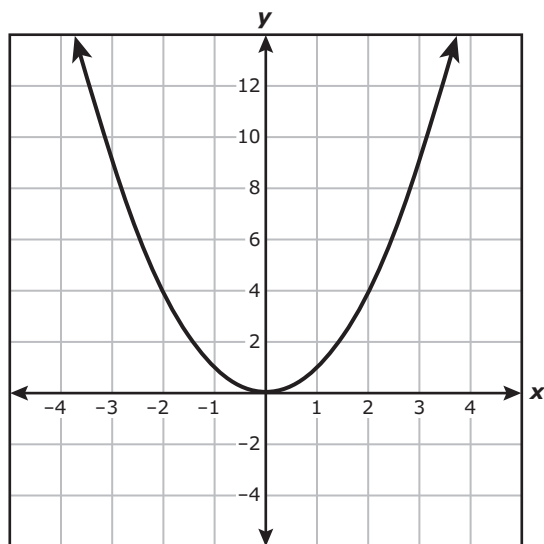
22 The sum of the first  $n$  consecutive even numbers can be found using  $S = n^2 + n$ , where  $n \geq 2$ . What is the value of  $n$  when the sum is 156?

- F 6
- G 39
- H 26
- J 12

23 Which graph represents  $-3x + 5y = -15$ ?



- 24 The graph of  $f(x) = x^2$  is shown on the grid.



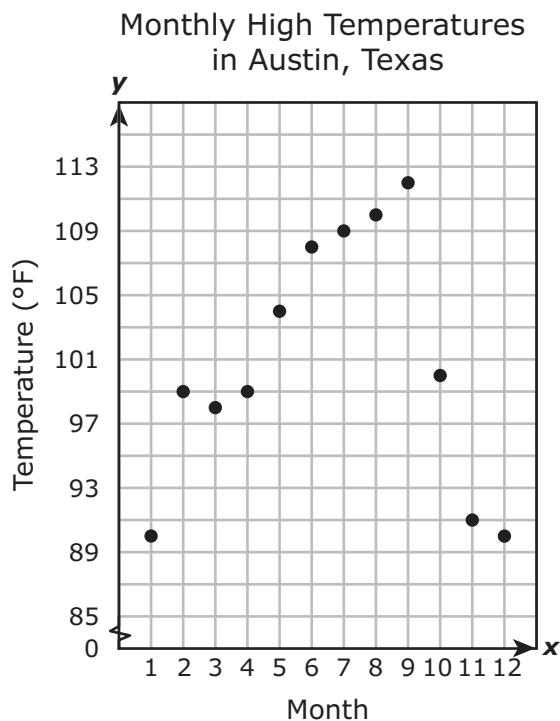
Which statement about the relationship between the graph of  $f$  and the graph of  $g(x) = 7x^2$  is true?

- F The graph of  $g$  is narrower than the graph of  $f$ .
- G The graph of  $g$  is wider than the graph of  $f$ .
- H The graph of  $g$  is 7 units below the graph of  $f$ .
- J The graph of  $g$  is 7 units above the graph of  $f$ .

- 
- 25 Which expression is a factor of  $36x^2 - 49$ ?

- A  $18x - 7$
- B  $6x - 49$
- C  $18x - 49$
- D  $6x - 7$

- 26 The scatterplot shows the monthly high temperatures for Austin, Texas, in degrees Fahrenheit over a 12-month period.



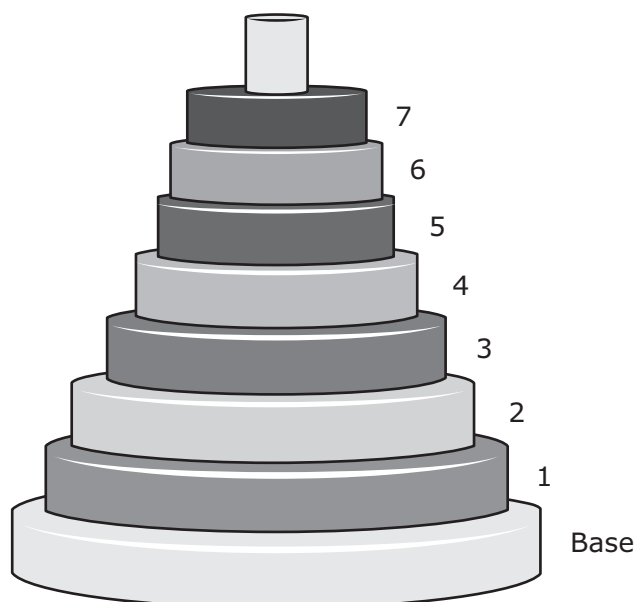
Which function best models the data from Month 1 to Month 9?

- F**  $y = -1.6x + 111$   
**G**  $y = 3.5x + 85$   
**H**  $y = 2.5x + 90$   
**J**  $y = -3.3x + 130$

- 
- 27 Given  $f(x) = 6(1 - x)$ , what is the value of  $f(-8)$ ?

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

- 28** A toy is made up of cylindrical rings stacked on a base, as shown in the diagram. The diameter of Ring 1 is 87% of the diameter of the base. For Ring 2 through Ring 7, the diameter of each ring is 87% of the diameter of the ring directly below it.



The diameter of the base is 5 inches. Which function can be used to find the diameter in inches of Ring  $r$ , where  $1 \leq r \leq 7$ ?

- F**  $d(r) = 5(0.87)^r$
- G**  $d(r) = 0.87(r - 5)$
- H**  $d(r) = 0.87(5)^r$
- J**  $d(r) = 5(r - 0.87)$
- 

- 29** What are the solutions to  $2(x - 7)^2 = 32$ ?

- A**  $x = 7 \pm \sqrt{32}$
- B**  $x = \pm \sqrt{65}$
- C**  $x = 3$  and  $x = 11$
- D**  $x = -1$  and  $x = 15$

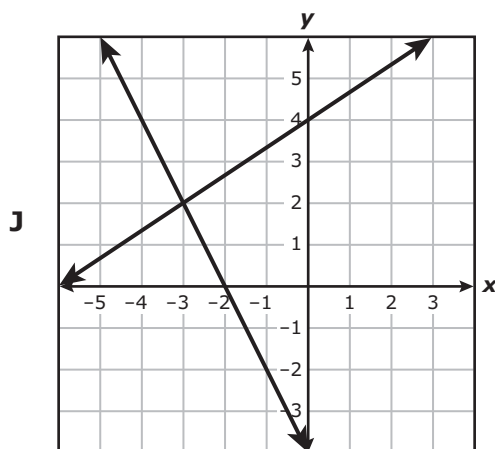
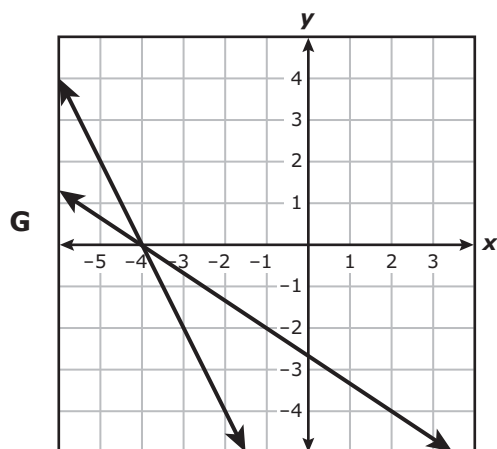
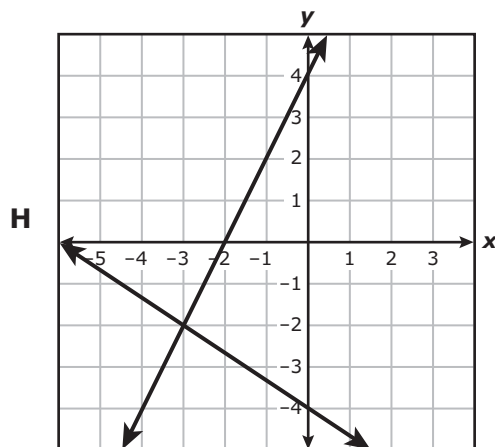
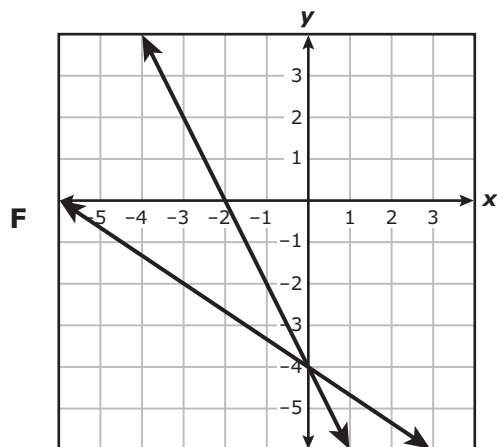


- 30** The total cost in dollars to buy uniforms for the players on a volleyball team can be found using the function  $c = 34.95u + 6.25$ , where  $u$  is the number of uniforms bought. If there are at least 8 players but not more than 12 players on the volleyball team, what is the domain of the function for this situation?
- F**  $0 < u \leq 12$
- G**  $0 < c \leq 425.65$
- H**  $\{8, 9, 10, 11, 12\}$
- J**  $\{285.85, 320.80, 355.75, 390.70, 425.65\}$
- 

- 31** A circle has a radius of  $6x^9y^5$  cm. The area of a circle can be found using  $A = \pi r^2$ . What is the area of this circle in square centimeters?
- A**  $12\pi x^{18}y^{10}$
- B**  $36\pi x^{18}y^{10}$
- C**  $36\pi x^{11}y^7$
- D**  $12\pi x^{11}y^7$

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

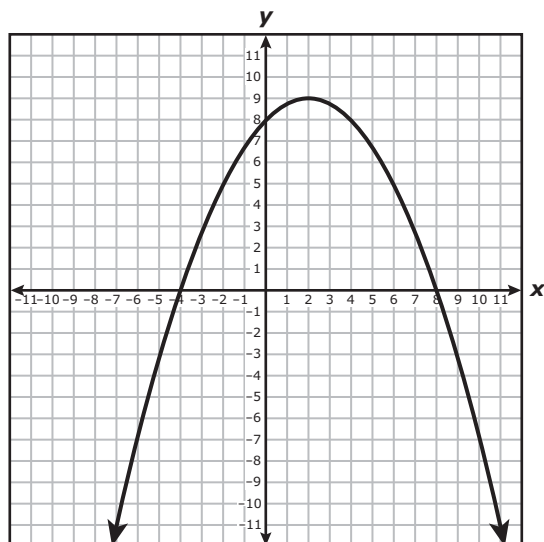
$$\begin{aligned}2x + y &= -4 \\ -3y &= 2x + 12\end{aligned}$$



33 Which inequality describes all the solutions to  $5(3 - x) < -2x + 6$ ?

- A  $x < -9$
- B  $x > 3$
- C  $x < -3$
- D  $x > 7$

- 34 The graph of quadratic function  $g$  is shown on the grid. The coordinates of the  $x$ -intercepts, the  $y$ -intercept, and the vertex are integers.



What is the maximum value of  $g$ ?

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

- 
- 35 An organization has a monthly budget of  $x$  dollars. Every month \$2,070 is spent on salaries. One-fourth of the remaining budget is spent on monthly activities. Which function can be used to find the amount in dollars spent on monthly activities?

- A  $f(x) = 2,070 + \frac{x}{4}$
- B  $f(x) = 2,070 - \frac{x}{4}$
- C  $f(x) = \frac{x + 2,070}{4}$
- D  $f(x) = \frac{x - 2,070}{4}$

36 Which table represents  $y$  as a function of  $x$ ?

**F**

$x$	$y$
-5	-5
3	-2
-5	5
-3	-2

**H**

$x$	$y$
-3	-4
1	4
-3	4
1	-4

**G**

$x$	$y$
6	-6
-6	6
8	-8
-8	8

**J**

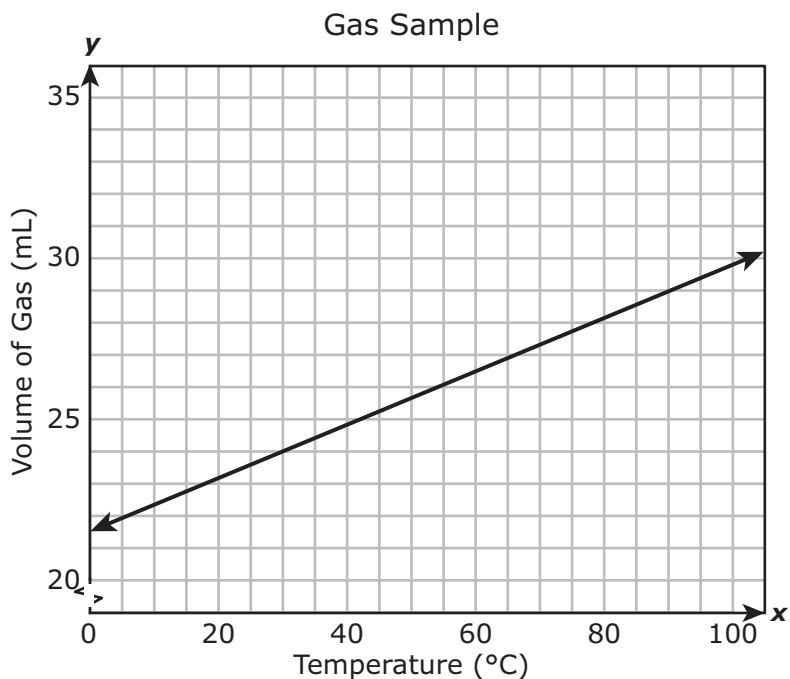
$x$	$y$
2	-1
2	-2
2	-3
2	-4

---

37 Which statement about  $f(x) = 2x^2 - 3x - 5$  is true?

- A** The zeros are  $-\frac{5}{2}$  and  $-1$ , because  $f(x) = (x + 1)(2x + 5)$ .
- B** The zeros are  $-\frac{5}{2}$  and  $1$ , because  $f(x) = (x - 1)(2x + 5)$ .
- C** The zeros are  $-1$  and  $\frac{5}{2}$ , because  $f(x) = (x + 1)(2x - 5)$ .
- D** The zeros are  $1$  and  $\frac{5}{2}$ , because  $f(x) = (x - 1)(2x - 5)$ .

- 38 The graph shows how the volume of a gas sample changes as the temperature changes and the pressure remains constant.



Which of these best represents the rate of change in the volume of the gas sample with respect to the temperature?

- F**  $\frac{7}{100}$  mL/°C
- G**  $\frac{1}{12}$  mL/°C
- H** 12 mL/°C
- J**  $22\frac{2}{5}$  mL/°C

39 What is the solution to this system of equations?

$$10x - y = 53$$

$$y = \frac{-13x + 92}{2}$$

- A (6, 7)
  - B (2, 33)
  - C (7, 6)
  - D (33, 2)
- 

40 The table contains some points on the graph of an exponential function.

$x$	$y$
0	0.0625
1	0.25
2	1
3	4

Based on the table, which function represents the same relationship?

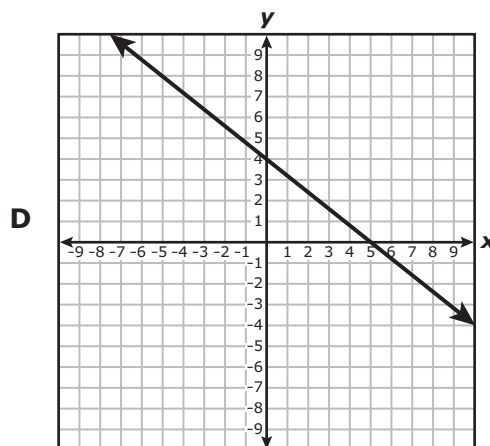
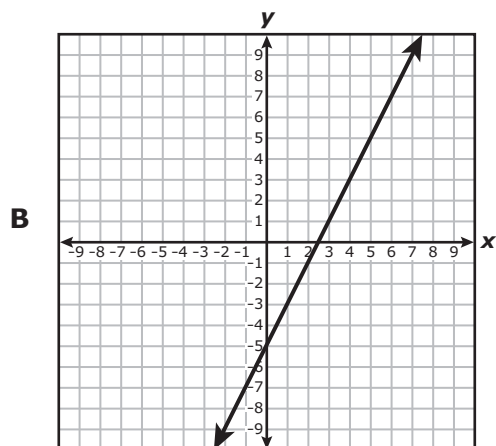
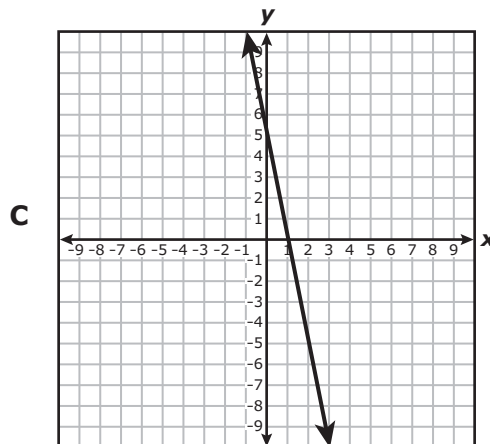
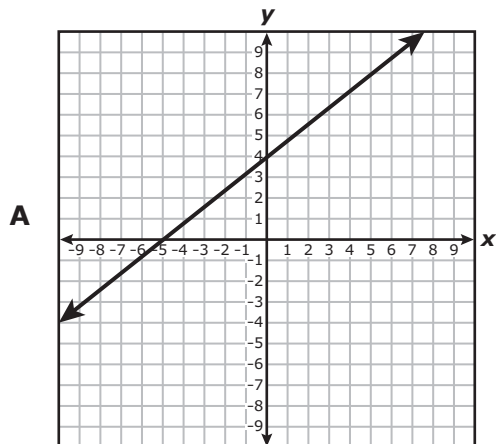
- F  $q(x) = (0.25)^x$
- G  $q(x) = 256(0.25)^x$
- H  $q(x) = 0.0625(4)^x$
- J  $q(x) = 0.5(4)^x$

- 41** Quadratic functions  $q$  and  $w$  are graphed on the same coordinate grid. The vertex of the graph of  $q$  is 18 units below the vertex of the graph of  $w$ . Which pair of functions could have been used to create the graphs of  $q$  and  $w$ ?
- A**  $q(x) = 18x^2$  and  $w(x) = x^2$
  - B**  $q(x) = x^2 + 18$  and  $w(x) = x^2$
  - C**  $q(x) = -18x^2$  and  $w(x) = x^2$
  - D**  $q(x) = x^2 - 18$  and  $w(x) = x^2$
- 

- 42** In an electrical circuit, the voltage across a resistor is directly proportional to the current running through the resistor. If a current of 12 amps produces 480 volts across a resistor, how many volts would a current of 1.5 amps produce across an identical resistor?

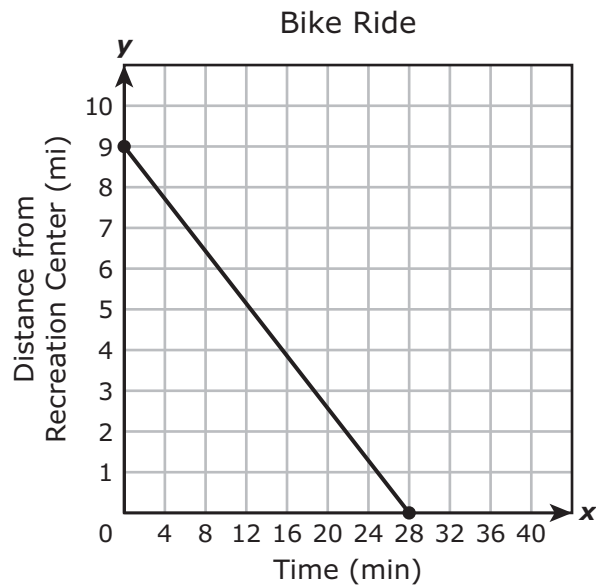
Record your answer and fill in the bubbles on your answer document.

43 Which graph shows a line with an x-intercept of  $-5$ ?





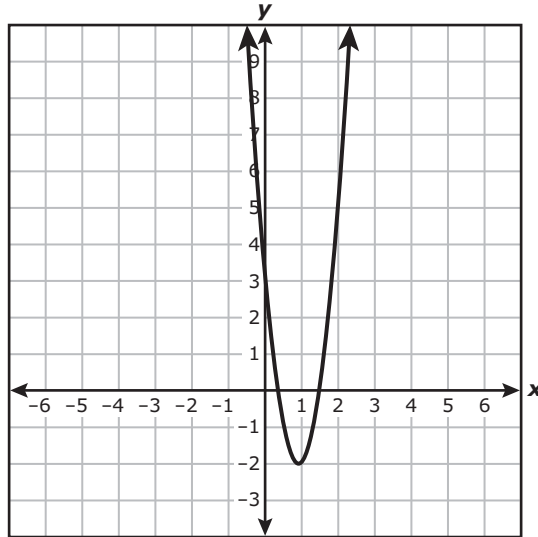
- 44 A student rode a bike from school to a recreation center. The graph shows the student's distance in miles from the recreation center after riding the bike for  $x$  minutes.



What is the range of the function for this situation?

- F All real numbers greater than or equal to 0 and less than or equal to 28
- G All real numbers greater than or equal to 0 and less than or equal to 9
- H All real numbers less than or equal to 28
- J All real numbers less than or equal to 9

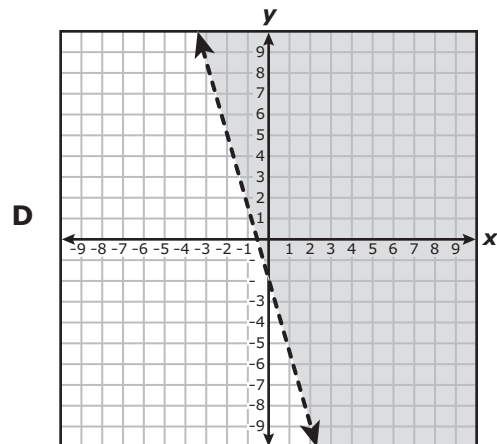
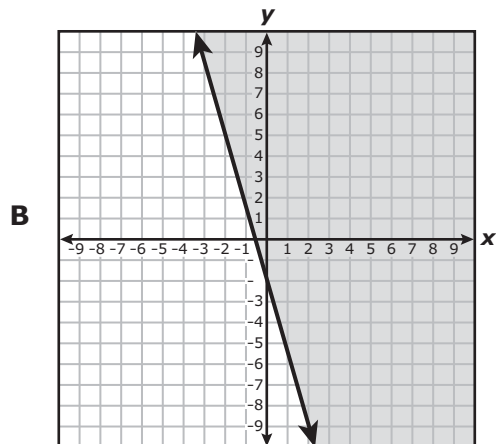
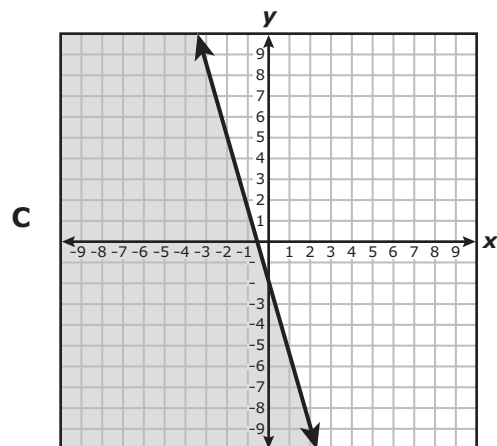
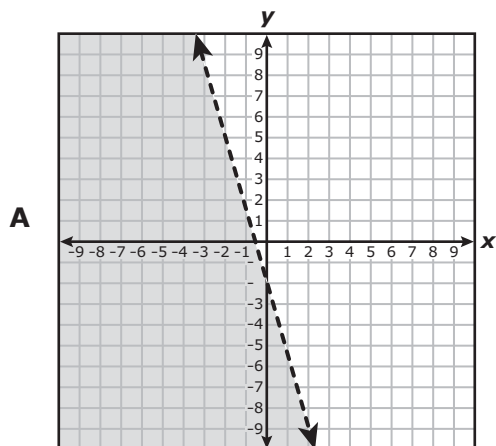
- 45 A graph of  $f(x) = 6x^2 - 11x + 3$  is shown on the grid.



What are the zeros of  $f$ ?

- A** 3
- B** 2 and 9
- C**  $\frac{11}{12}$
- D**  $\frac{1}{3}$  and  $\frac{3}{2}$
- 
- 46 Which equation in standard form has a graph that passes through the point  $(-4, 2)$  and has a slope of  $\frac{9}{2}$ ?
- F**  $9x - 2y = 36$
- G**  $9x - 2y = 26$
- H**  $9x - 2y = -40$
- J**  $9x - 2y = -10$

47 Which graph represents the solution set of  $y \geq -\frac{7}{2}x - 2$ ?



**48** A bag contains 18 coins consisting of quarters and dimes. The total value of the coins is \$2.85. Which system of equations can be used to determine the number of quarters,  $q$ , and the number of dimes,  $d$ , in the bag?

**F**  $0.10q + 0.25d = 2.85$   
 $q + d = 18$

**G**  $0.10q + 0.25d = 18$   
 $q + d = 2.85$

**H**  $0.25q + 0.10d = 2.85$   
 $q + d = 18$

**J**  $0.25q + 0.10d = 18$   
 $q + d = 2.85$

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**49** Which expression is a factor of  $x^2 - 5x - 6$ ?

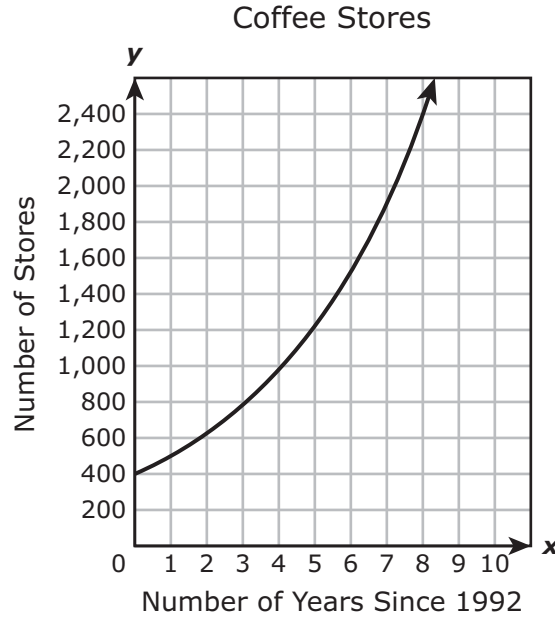
**A**  $x - 6$

**B**  $x - 2$

**C**  $x - 3$

**D**  $x - 1$

- 50 The number of stores opened by a coffee company can be modeled by the exponential function graphed on the grid, where  $x$  is the number of years since 1992.



Based on the graph, which statement does **not** appear to be true?

- F The coffee company had opened 400 stores by the end of 1992.
- G The coffee company opened 100 stores in one year.
- H Every year the number of stores the coffee company opened increased by 25%.
- J Since 1992 the coffee company has opened 250 stores each year.

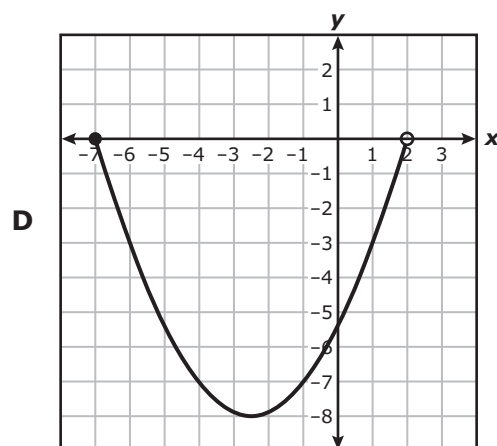
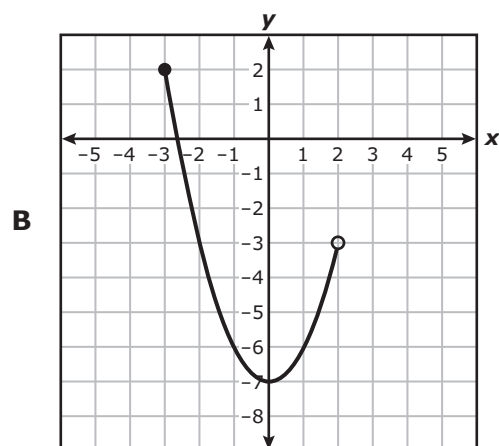
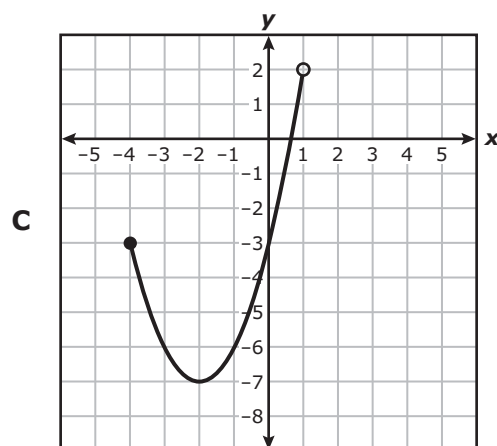
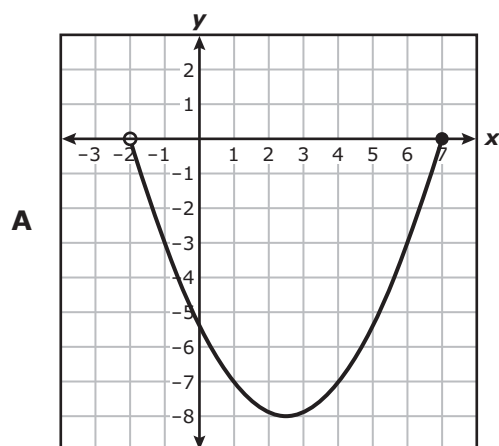
- 
- 51 What is the slope of the line that passes through the points  $(26, 7)$  and  $(-39, 12)$ ?

- A  $-\frac{1}{13}$
- B  $\frac{5}{13}$
- C  $-13$
- D  $\frac{13}{5}$

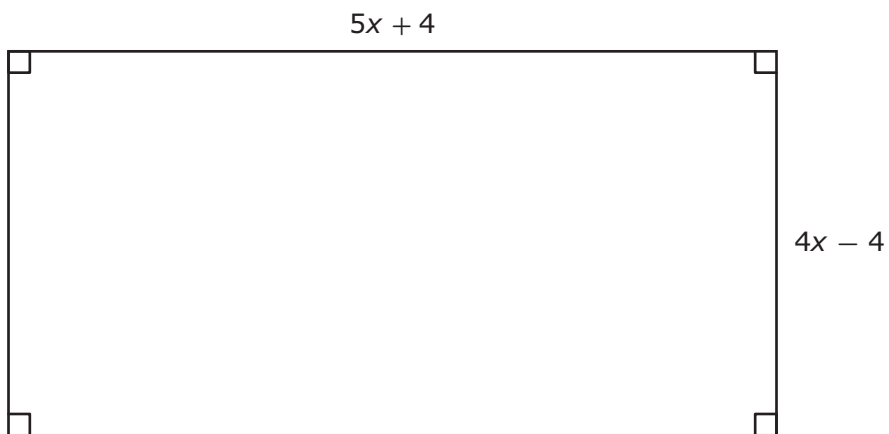
52 What is the solution to  $0.3(12x - 16) = 0.4(12 - 3x)$ ?

- F -2
- G 4
- H 2
- J -4

53 Which graph represents a function with a domain of all real numbers greater than or equal to  $-7$  and less than  $2$ ?



54 The diagram shows the floor plan of a storage facility. All dimensions are given in feet.



Which expression represents the area of the storage facility in square feet?

**F**  $20x^2 + 36x - 16$

**G**  $20x^2 - 4x - 16$

**H**  $16x^2 - 16$

**J**  $9x^2 - 16$



**STAAR  
Algebra I  
May 2016**





Item Number	Reporting Category	Readiness or Supporting	Content Student Expectation	Process Student Expectation	Correct Answer
1	2	Readiness	A.3(B)	A.1 (A),(B),(C),(E),(F)	A
2	1	Supporting	A.10(A)	A.1 (B),(F)	G
3	3	Supporting	A.2(H)	A.1 (A),(B),(D),(F)	B
4	4	Readiness	A.7(C)	A.1 (B),(E),(F)	H
5	3	Readiness	A.2(C)	A.1 (B),(D),(F)	A
6	1	Readiness	A.10(E)	A.1 (B),(F)	J
7	2	Readiness	A.3(D)	A.1 (B),(E),(F)	C
8	3	Readiness	A.5(A)	A.1 (B),(F)	J
9	5	Readiness	A.9(D)	A.1 (A),(B),(D),(F)	A
10	1	Readiness	A.11(B)	A.1 (B),(C),(F)	H
11	2	Supporting	A.3(E)	A.1 (B),(G)	B
12	4	Readiness	A.6(A)	A.1 (B),(E),(F)	H
13	3	Readiness	A.2(I)	A.1 (A),(B),(D),(F)	A
14	2	Readiness	A.3(C)	A.1 (B),(E),(F)	5.5
15	1	Supporting	A.10(D)	A.1 (B),(F)	C
16	4	Supporting	A.7(B)	A.1 (B),(G)	G
17	5	Supporting	A.9(E)	A.1 (A),(B),(C),(E),(F)	D
18	1	Supporting	A.12(E)	A.1 (B),(F)	J
19	2	Readiness	A.3(B)	A.1 (B),(C),(E),(F)	B
20	3	Readiness	A.5(C)	A.1 (A),(B),(F)	13
21	5	Supporting	A.9(A)	A.1 (B),(E),(G)	C
22	4	Readiness	A.8(A)	A.1 (B),(F)	J
23	2	Readiness	A.3(C)	A.1 (B),(D),(F)	B
24	4	Readiness	A.7(C)	A.1 (B),(E),(G)	F
25	1	Supporting	A.10(F)	A.1 (B),(C),(F)	D
26	2	Supporting	A.4(C)	A.1 (A),(B),(C),(E),(F)	H
27	1	Supporting	A.12(B)	A.1 (B),(F)	54
28	5	Readiness	A.9(C)	A.1 (A),(B),(E),(F)	F
29	4	Readiness	A.8(A)	A.1 (B),(C),(F)	C
30	3	Readiness	A.2(A)	A.1 (A),(B),(F)	H
31	1	Readiness	A.11(B)	A.1 (B),(C),(F)	B
32	2	Supporting	A.3(F)	A.1 (B),(D),(F)	F
33	3	Supporting	A.5(B)	A.1 (B),(F)	B
34	4	Readiness	A.7(A)	A.1 (B),(E),(F)	9
35	3	Readiness	A.2(C)	A.1 (A),(B),(D),(F)	D
36	1	Supporting	A.12(A)	A.1 (B),(E),(F)	G
37	4	Supporting	A.7(B)	A.1 (B),(G)	C
38	2	Readiness	A.3(B)	A.1 (A),(B),(C),(E),(F)	G
39	3	Readiness	A.5(C)	A.1 (B),(F)	A
40	5	Readiness	A.9(C)	A.1 (B),(D),(F)	H
41	4	Readiness	A.7(C)	A.1 (B),(F)	D
42	3	Supporting	A.2(D)	A.1 (A),(B),(F)	60
43	2	Readiness	A.3(C)	A.1 (B),(E),(F)	A
44	3	Readiness	A.2(A)	A.1 (A),(B),(E),(G)	G
45	4	Readiness	A.7(A)	A.1 (B),(E),(F)	D
46	3	Supporting	A.2(B)	A.1 (B),(C),(F)	H
47	2	Readiness	A.3(D)	A.1 (B),(D),(F)	B
48	3	Readiness	A.2(I)	A.1 (A),(B),(D),(F)	H
49	1	Readiness	A.10(E)	A.1 (B),(F)	A
50	5	Readiness	A.9(D)	A.1 (A),(B),(E),(G)	J
51	2	Supporting	A.3(A)	A.1 (B),(C),(F)	A
52	3	Readiness	A.5(A)	A.1 (B),(F)	H
53	4	Readiness	A.6(A)	A.1 (B),(E),(F)	D
54	1	Supporting	A.10(B)	A.1 (A),(B),(E),(F)	G

# STAAR Algebra I Assessment

## Mathematical Process Standards

**These student expectations will not be listed under a separate reporting category. Instead, they will be incorporated into test questions across reporting categories since the application of mathematical process standards is part of each knowledge statement.**

- (A.1) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to
- (A) apply mathematics to problems arising in everyday life, society, and the workplace;
  - (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
  - (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
  - (D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
  - (E) create and use representations to organize, record, and communicate mathematical ideas;
  - (F) analyze mathematical relationships to connect and communicate mathematical ideas; and
  - (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

## Reporting Category 1: Number and Algebraic Methods

The student will demonstrate an understanding of how to use algebraic methods to manipulate numbers, expressions, and equations.

- (A.10) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to rewrite in equivalent forms and perform operations on polynomial expressions. The student is expected to
- (A) add and subtract polynomials of degree one and degree two;  
**Supporting Standard**
  - (B) multiply polynomials of degree one and degree two;  
**Supporting Standard**
  - (C) determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend; **Supporting Standard**
  - (D) rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property;  
**Supporting Standard**
  - (E) factor, if possible, trinomials with real factors in the form  $ax^2 + bx + c$ , including perfect square trinomials of degree two; and  
**Readiness Standard**
  - (F) decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial. **Supporting Standard**
- (A.11) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to rewrite algebraic expressions into equivalent forms. The student is expected to
- (A) simplify numerical radical expressions involving square roots; and  
**Supporting Standard**
  - (B) simplify numeric and algebraic expressions using the laws of exponents, including integral and rational exponents.  
**Readiness Standard**

- (A.12) **Number and algebraic methods.** The student applies the mathematical process standards and algebraic methods to write, solve, analyze, and evaluate equations, relations, and functions. The student is expected to
- (A) decide whether relations represented verbally, tabularly, graphically, and symbolically define a function; **Supporting Standard**
  - (B) evaluate functions, expressed in function notation, given one or more elements in their domains; **Supporting Standard**
  - (C) identify terms of arithmetic and geometric sequences when the sequences are given in function form using recursive processes; **Supporting Standard**
  - (D) write a formula for the  $n^{\text{th}}$  term of arithmetic and geometric sequences, given the value of several of their terms; and **Supporting Standard**
  - (E) solve mathematic and scientific formulas, and other literal equations, for a specified variable. **Supporting Standard**

## Reporting Category 2: Describing and Graphing Linear Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to describe and graph linear functions, equations, and inequalities.

- (A.3) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards when using graphs of linear functions, key features, and related transformations to represent in multiple ways and solve, with and without technology, equations, inequalities, and systems of equations. The student is expected to
- (A) determine the slope of a line given a table of values, a graph, two points on the line, and an equation written in various forms, including  $y = mx + b$ ,  $Ax + By = C$ , and  $y - y_1 = m(x - x_1)$ ; **Supporting Standard**
  - (B) calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems; **Readiness Standard**
  - (C) graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems; **Readiness Standard**
  - (D) graph the solution set of linear inequalities in two variables on the coordinate plane; **Readiness Standard**
  - (E) determine the effects on the graph of the parent function  $f(x) = x$  when  $f(x)$  is replaced by  $af(x)$ ,  $f(x) + d$ ,  $f(x - c)$ ,  $f(bx)$  for specific values of  $a$ ,  $b$ ,  $c$ , and  $d$ ; **Supporting Standard**
  - (F) graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist; **Supporting Standard**
  - (G) estimate graphically the solutions to systems of two linear equations with two variables in real-world problems; and **Supporting Standard**
  - (H) graph the solution set of systems of two linear inequalities in two variables on the coordinate plane. **Supporting Standard**

- (A.4) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards to formulate statistical relationships and evaluate their reasonableness based on real-world data. The student is expected to
- (A) calculate, using technology, the correlation coefficient between two quantitative variables and interpret this quantity as a measure of the strength of the linear association; **Supporting Standard**
  - (B) compare and contrast association and causation in real-world problems; and **Supporting Standard**
  - (C) write, with and without technology, linear functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems. **Supporting Standard**

## Reporting Category 3: Writing and Solving Linear Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to write and solve linear functions, equations, and inequalities.

- (A.2) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations. The student is expected to
- (A) determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities; **Readiness Standard**
  - (B) write linear equations in two variables in various forms, including  $y = mx + b$ ,  $Ax + By = C$ , and  $y - y_1 = m(x - x_1)$ , given one point and the slope and given two points; **Supporting Standard**
  - (C) write linear equations in two variables given a table of values, a graph, and a verbal description; **Readiness Standard**
  - (D) write and solve equations involving direct variation; **Supporting Standard**
  - (E) write the equation of a line that contains a given point and is parallel to a given line; **Supporting Standard**
  - (F) write the equation of a line that contains a given point and is perpendicular to a given line; **Supporting Standard**
  - (G) write an equation of a line that is parallel or perpendicular to the  $x$ - or  $y$ -axis and determine whether the slope of the line is zero or undefined; **Supporting Standard**
  - (H) write linear inequalities in two variables given a table of values, a graph, and a verbal description; and **Supporting Standard**
  - (I) write systems of two linear equations given a table of values, a graph, and a verbal description. **Readiness Standard**

- (A.5) **Linear functions, equations, and inequalities.** The student applies the mathematical process standards to solve, with and without technology, linear equations and evaluate the reasonableness of their solutions. The student is expected to
- (A) solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; **Readiness Standard**
  - (B) solve linear inequalities in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides; and **Supporting Standard**
  - (C) solve systems of two linear equations with two variables for mathematical and real-world problems. **Readiness Standard**



## Reporting Category 4: Quadratic Functions and Equations

The student will demonstrate an understanding of how to describe, write, and solve quadratic functions and equations.

- (A.6) **Quadratic functions and equations.** The student applies the mathematical process standards when using properties of quadratic functions to write and represent in multiple ways, with and without technology, quadratic equations. The student is expected to
- (A) determine the domain and range of quadratic functions and represent the domain and range using inequalities;  
**Readiness Standard**
  - (B) write equations of quadratic functions given the vertex and another point on the graph, write the equation in vertex form ( $f(x) = a(x - h)^2 + k$ ), and rewrite the equation from vertex form to standard form ( $f(x) = ax^2 + bx + c$ ); and **Supporting Standard**
  - (C) write quadratic functions when given real solutions and graphs of their related equations. **Supporting Standard**
- (A.7) **Quadratic functions and equations.** The student applies the mathematical process standards when using graphs of quadratic functions and their related transformations to represent in multiple ways and determine, with and without technology, the solutions to equations. The student is expected to
- (A) graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry; **Readiness Standard**
  - (B) describe the relationship between the linear factors of quadratic expressions and the zeros of their associated quadratic functions; and **Supporting Standard**
  - (C) determine the effects on the graph of the parent function  $f(x) = x^2$  when  $f(x)$  is replaced by  $af(x)$ ,  $f(x) + d$ ,  $f(x - c)$ ,  $f(bx)$  for specific values of  $a$ ,  $b$ ,  $c$ , and  $d$ . **Readiness Standard**

(A.8) **Quadratic functions and equations.** The student applies the mathematical process standards to solve, with and without technology, quadratic equations and evaluate the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data. The student is expected to

- (A) solve quadratic equations having real solutions by factoring, taking square roots, completing the square, and applying the quadratic formula; and **Readiness Standard**
- (B) write, using technology, quadratic functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems. **Supporting Standard**

## Reporting Category 5: Exponential Functions and Equations

**The student will demonstrate an understanding of how to describe and write exponential functions and equations.**

- (A.9) **Exponential functions and equations.** The student applies the mathematical process standards when using properties of exponential functions and their related transformations to write, graph, and represent in multiple ways exponential equations and evaluate, with and without technology, the reasonableness of their solutions. The student formulates statistical relationships and evaluates their reasonableness based on real-world data. The student is expected to
- (A) determine the domain and range of exponential functions of the form  $f(x) = ab^x$  and represent the domain and range using inequalities;  
**Supporting Standard**
  - (B) interpret the meaning of the values of  $a$  and  $b$  in exponential functions of the form  $f(x) = ab^x$  in real-world problems;  
**Supporting Standard**
  - (C) write exponential functions in the form  $f(x) = ab^x$  (where  $b$  is a rational number) to describe problems arising from mathematical and real-world situations, including growth and decay;  
**Readiness Standard**
  - (D) graph exponential functions that model growth and decay and identify key features, including  $y$ -intercept and asymptote, in mathematical and real-world problems; and **Readiness Standard**
  - (E) write, using technology, exponential functions that provide a reasonable fit to data and make predictions for real-world problems.  
**Supporting Standard**