STAAR®

State of Texas Assessments of Academic Readiness

Algebra I

Administered May 2018

RELEASED

STAAR ALGEBRA I REFERENCE MATERIALS
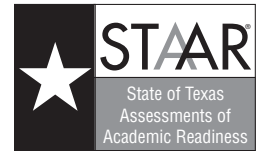
FACTORING

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

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

QUADRATIC EQUATIONS

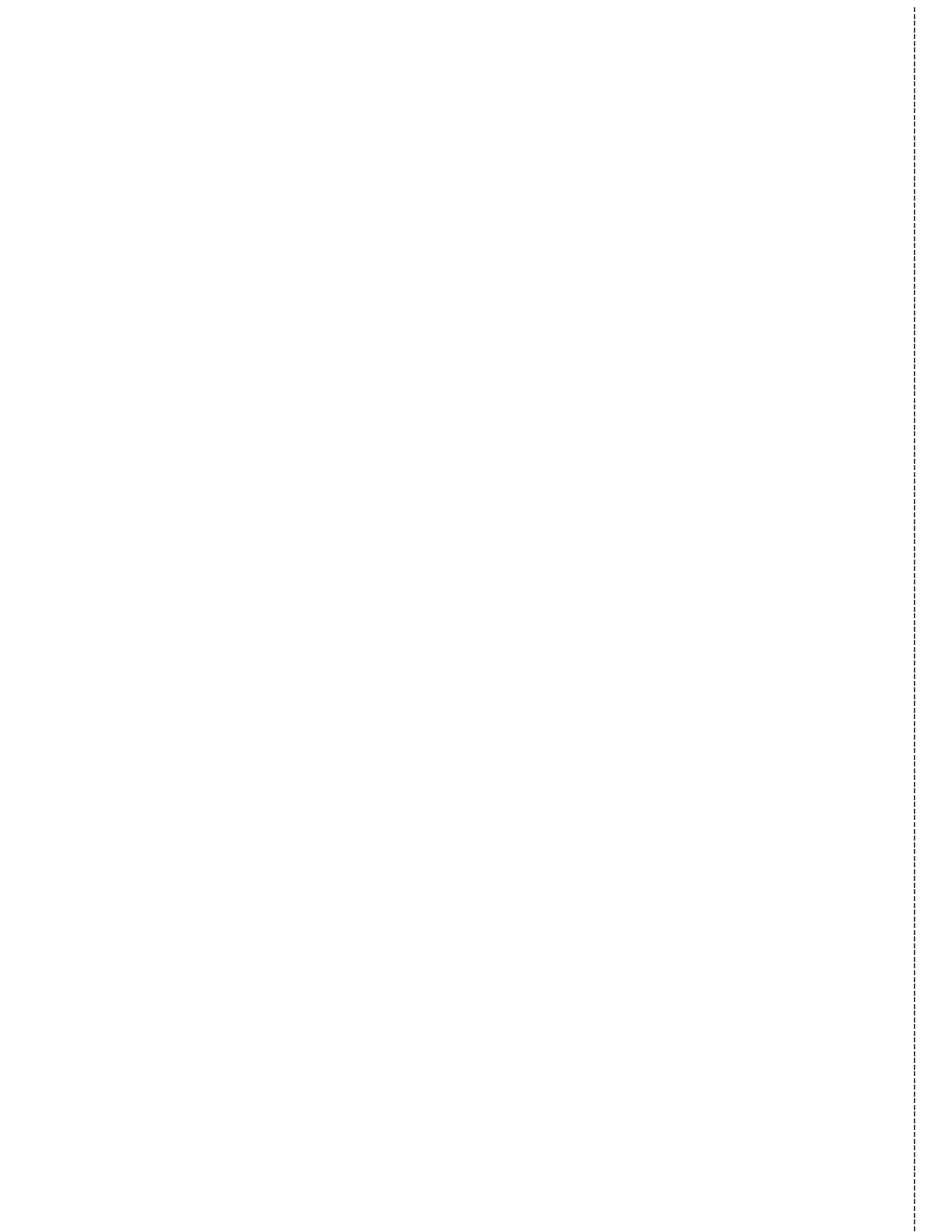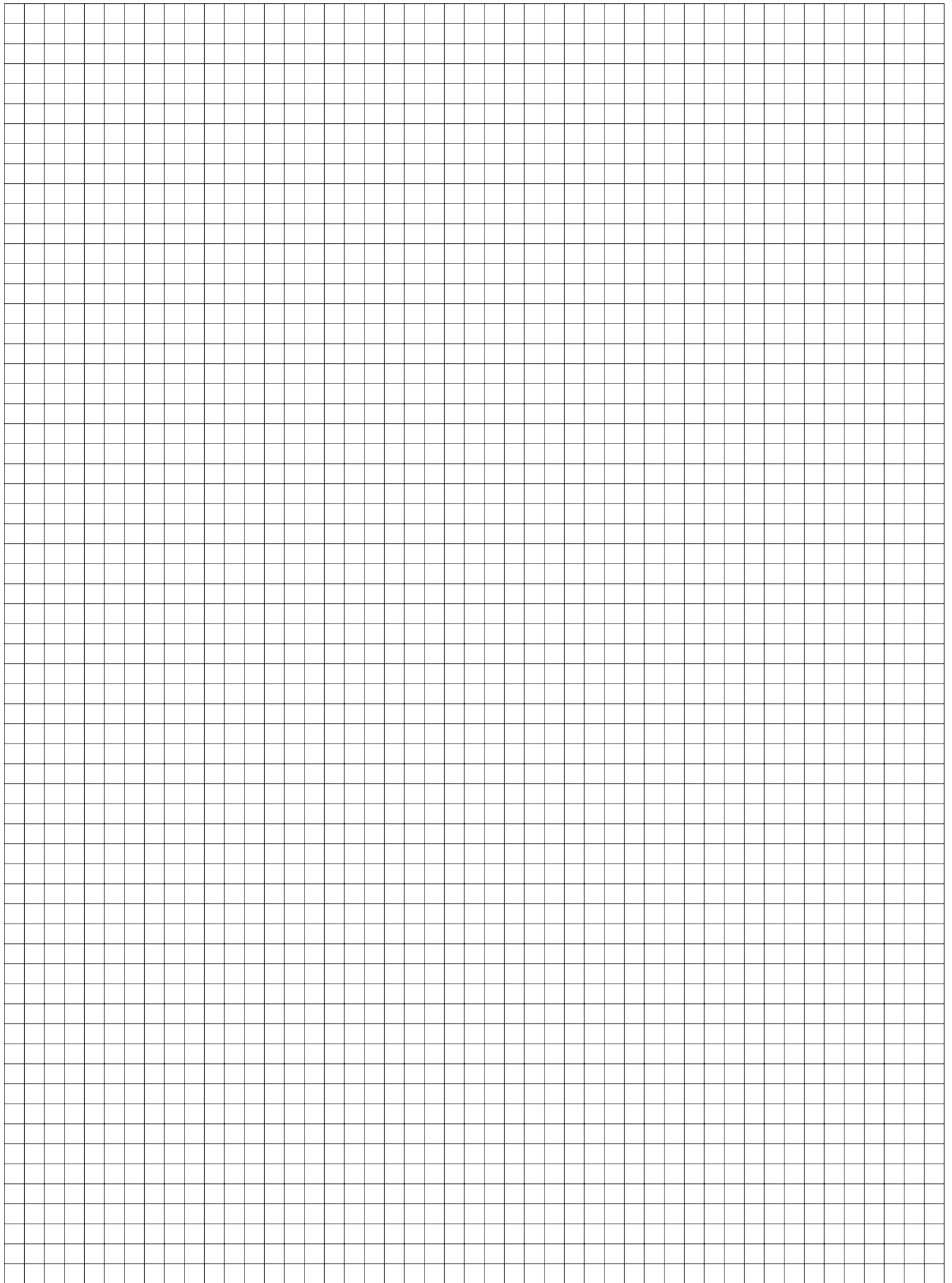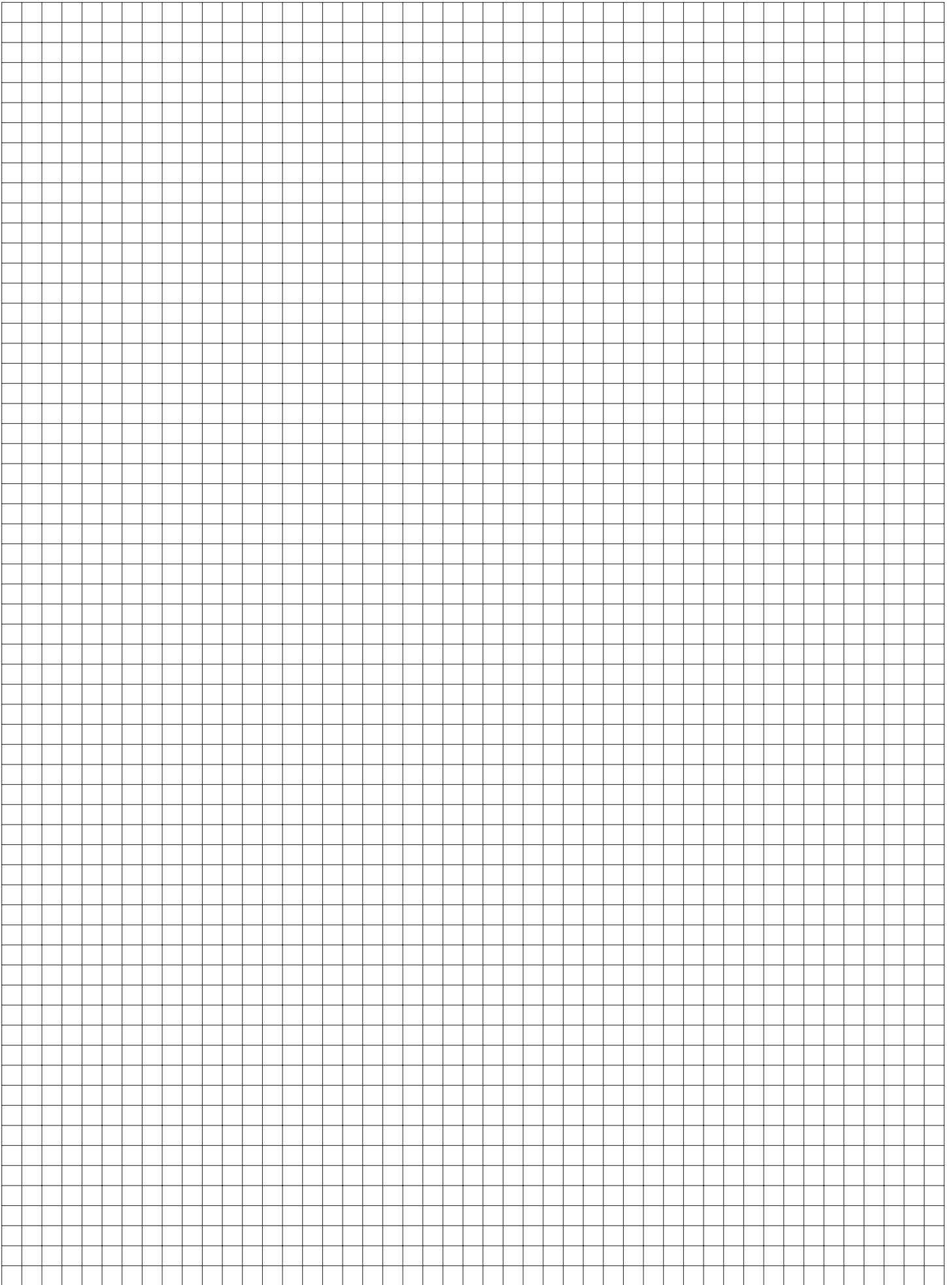|	
Standard form	$f(x) = ax^2 + bx + c$
Vertex form	$f(x) = a(x - h)^2 + k$
Quadratic formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Axis of symmetry	$x = \dfrac{-b}{2a}$

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 At a restaurant jars of tomato sauce are stored in boxes in the pantry. Each box contains 8 jars of tomato sauce. A cook uses 2 jars from 1 of the boxes.
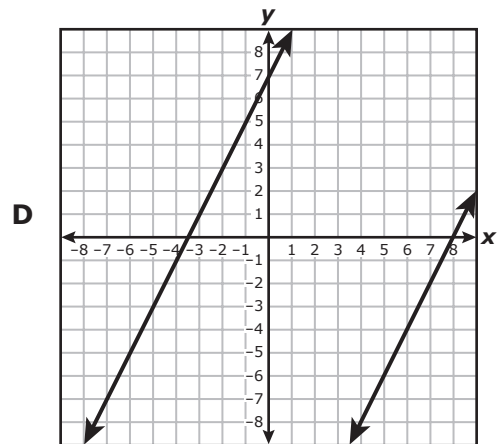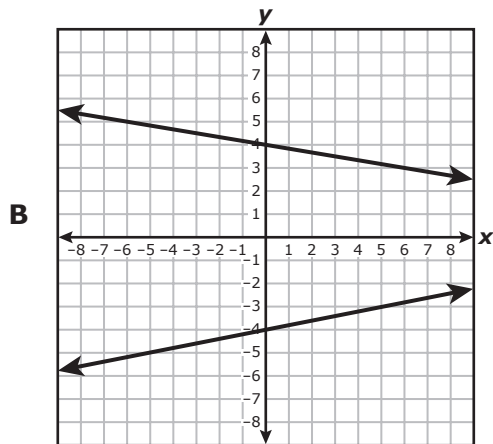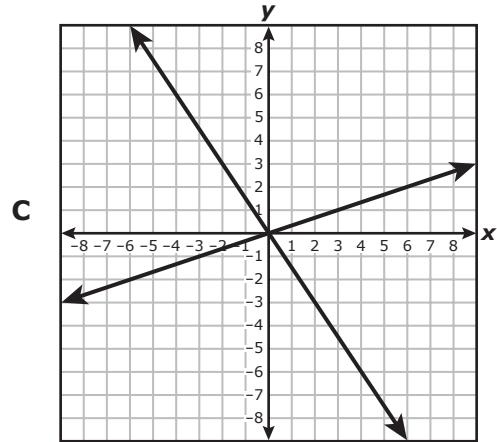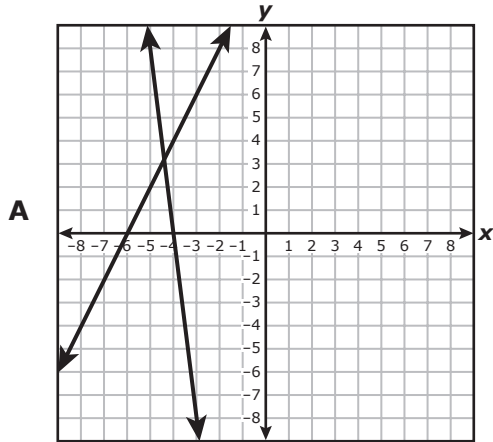
Which function shows the relationship between y, the total number of jars of tomato sauce remaining in the pantry, and x, the number of boxes in the pantry?

A $y = 8x + 6$

B $y = 8x$

C $y = 8x - 2$

D $y = 6x$

2 Which expression is equivalent to $-28x^2 + 35x$?

F $7x(4x + 5)$

G $-7x(4x - 5)$

H $7x(4x - 5)$

J $-7x(4x + 5)$

3 Which graph best represents a system of equations that has no solution?

A

C

B

D

---

4 Which statement about the graph of $y = 8(0.25)^x$ is true?

F The coordinates of the x-intercept are $(0.25, 0)$.

G The coordinates of the y-intercept are $(0, 8)$.

H The equation of the asymptote is $x = 0$.

J The graph includes the point $(2, 1)$.

GO ON

5 What is the range of $y = -x^2 - 2x + 3$?

A $x \leq 4$

B $x \geq -4$

C $y \leq 4$

D $y \geq -4$

---

6 Which expression is equivalent to $(144k^2r^{14})^{\frac{1}{2}}$ for all positive values of k and r?
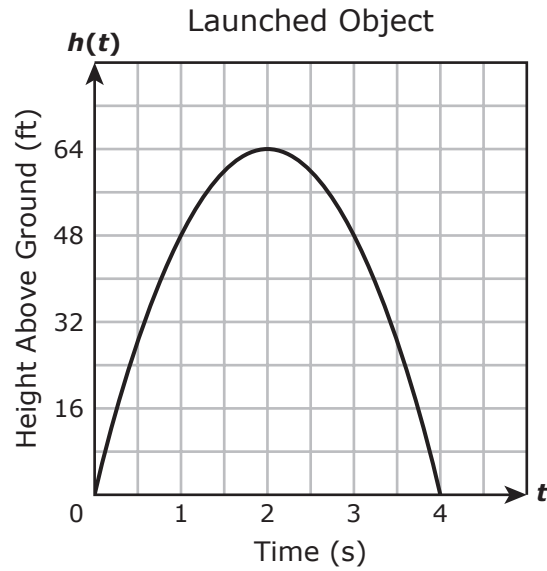
F $12kr^7$

G $72k^2r^{14}$

H $144kr^7$

J $12k^2r^{14}$

GO ON

7 The graph shows the height in feet of an object above the ground t seconds after it was launched from the ground.

Launched Object

Which function is best represented by the graph of this situation?

A $h(t) = -16t^2 - 64t$

B $h(t) = -16t^2 + 128t - 256$

C $h(t) = -16t^2 + 64t$

D $h(t) = -16t^2 - 128t - 256$

---

8 What value of n makes the equation $4(0.5n - 3) = n - 0.25(12 - 8n)$ true?

F 3

G −9

H 0

J −15

9 In a sequence of numbers, $a_3 = 0$, $a_4 = 6$, $a_5 = 12$, $a_6 = 18$, and $a_7 = 24$. Based on this information, which equation can be used to find the nth term in the sequence, a_n?

  A $a_n = -6n + 18$

  B $a_n = -18n + 6$

  C $a_n = 6n - 18$

  D $a_n = 18n - 6$

---

10 The value of y varies directly with x. If $x = 3$, then $y = 21$. What is the value of x when $y = 105$?

  F $\dfrac{3}{5}$

  G $1\dfrac{2}{3}$

  H 7

  J 15

---

11 Which expression is equivalent to $x^2 - 17x - 60$?

  A $(x - 20)(x + 3)$

 **B** $(x - 5)(x - 12)$

  C $(x - 20)(x - 3)$

  D $(x + 5)(x - 12)$

12 A zookeeper recorded the feeding schedule for a baby rhinoceros for 20 weeks. The table and scatterplot show the percentage of the baby rhinoceros's body mass that was used to determine the amount of food given at each feeding as a linear function of its age in weeks.

Baby Rhinoceros Feeding Schedule

| Age (weeks)	1	2	4	7	9	12	14	15	17	20
Percentage of Body Mass	20	19.5	17	15	14	13.5	12.4	11.6	11	9
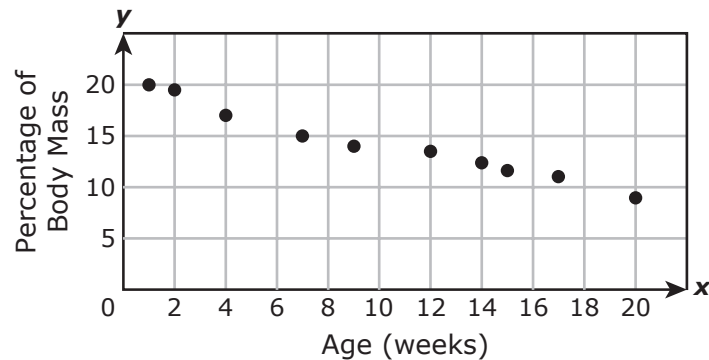
What is the best prediction of the percentage of the baby rhinoceros's body mass that should be used to determine the amount of food given at each feeding when it is 25 weeks old?

F 8.5%

G 6%

H 2.5%

J 10%

13 What are the domain and range of $f(x) = -37$?

A Domain: All real numbers greater than or equal to −37
Range: All real numbers

B Domain: {−37}
Range: All real numbers

C Domain: All real numbers
Range: All real numbers greater than or equal to −37

D Domain: All real numbers
Range: {−37}

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

$(-3, 3)$ $(3, 3)$
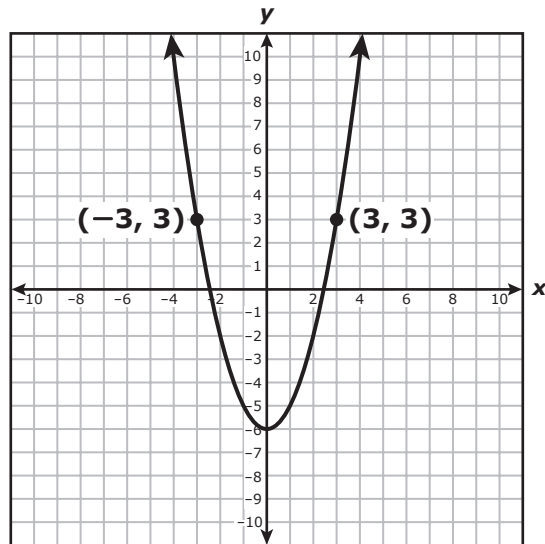
If $k(x) = x^2$ and $p(x) = k(x) + n$, what is the value of n?

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

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15 Two customers went to a post office to buy postcards and large envelopes. Each postcard costs the same amount, and each large envelope costs the same amount.

- The first customer paid $12 for 14 postcards and 5 large envelopes.
- The second customer paid $24.80 for 10 postcards and 15 large envelopes.

What was the cost in dollars of each large envelope?

A $1.42

B $0.35

C $1.15

D $0.63

16 The water level of a river was measured each day during a two-week period. The graph models the linear relationship between the water level of the river in feet and the number of days the water level was measured.

Water Level of River
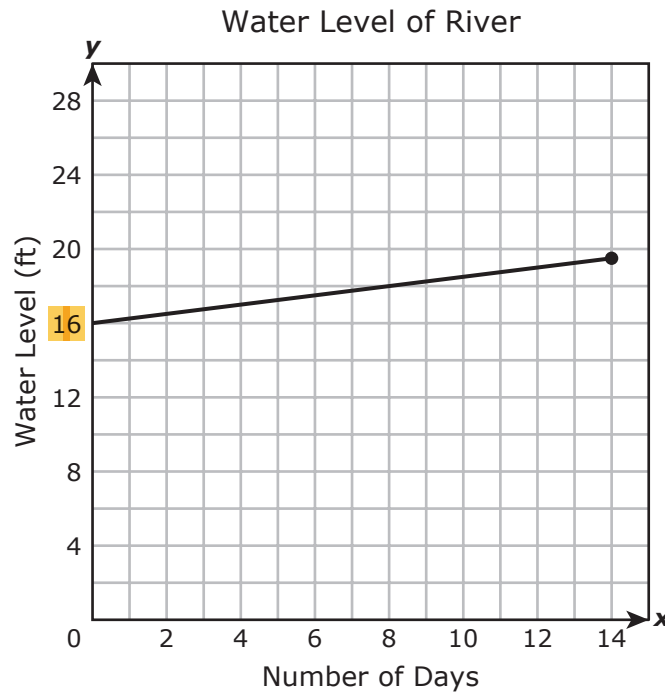
Which statement best describes the *y*-intercept of the graph?

F The water level increased by 0.25 ft per day.

G The maximum water level was 19.5 ft.

H The initial water level was 16 ft.

J The water level was measured for 14 days.

---

17 There are 1,024 players in a tennis tournament. In each round, half the players are eliminated. Which function can be used to find the number of players remaining in the tournament at the end of *x* rounds?

A $f(x) = 1{,}024(1.50)^x$

B $f(x) = 1{,}024(0.50)^x$

C $f(x) = 1{,}024(1.05)^x$

D $f(x) = 1{,}024(0.05)^x$

GO ON

18 Which statement about $g(x) = x^2 - 576$ is true?

F The zeros, -288 and 288, can be found when $0 = (x + 288)(x - 288)$.

G The only zero, 288, can be found when $0 = (x - 288)^2$.

H The zeros, -24 and 24, can be found when $0 = (x + 24)(x - 24)$.

**J** The only zero, 24, can be found when $0 = (x - 24)^2$.

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19 Which graph best represents the solution set of $-4x \leq 6y - 54$?

A

C

B

D
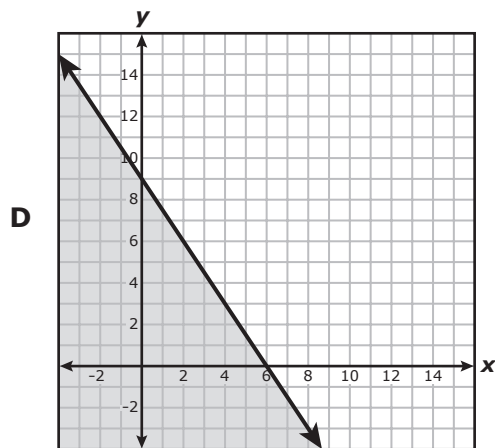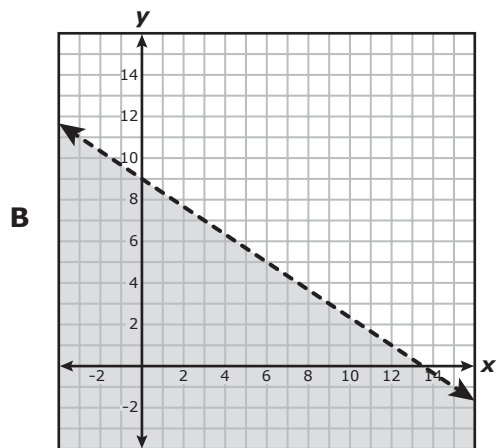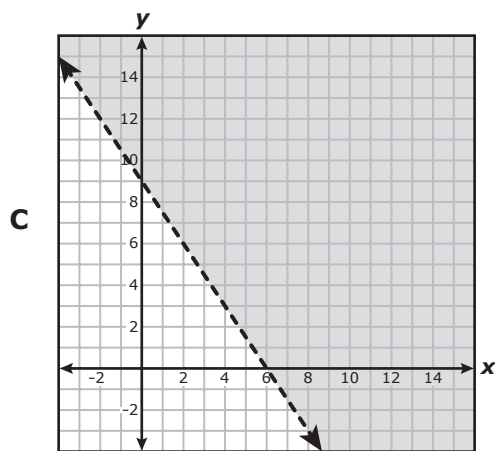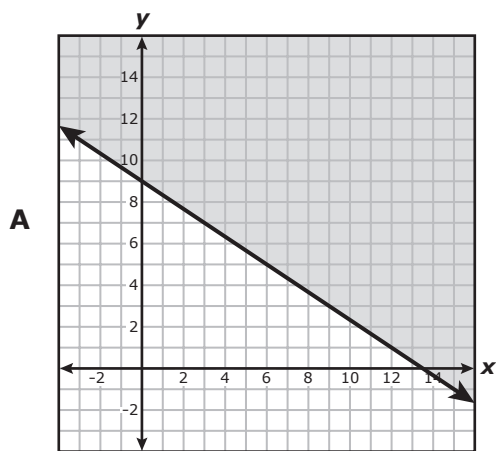
20 Given $f(x) = \dfrac{1}{3}(4 - x)^2$, what is the value of $f(16)$?

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

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21 The graph shows the linear relationship between the maximum area in square feet that can be painted and the number of gallons of paint used.

Paint Coverage
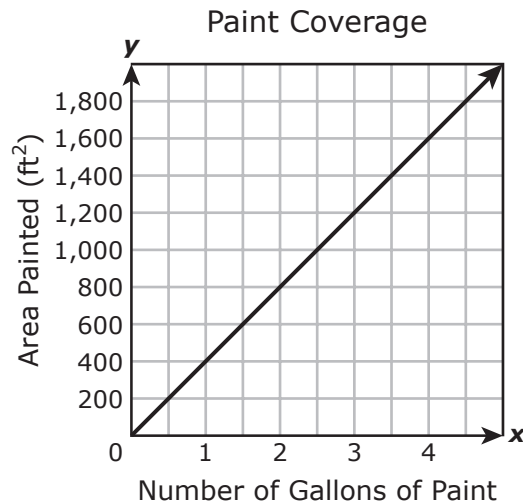
Which of these best represents the rate of change of the maximum area painted with respect to the number of gallons of paint used?

A $200\,\text{ft}^2/\text{gal}$

B $\dfrac{1}{200}\,\text{ft}^2/\text{gal}$

C $400\,\text{ft}^2/\text{gal}$

D $\dfrac{1}{400}\,\text{ft}^2/\text{gal}$

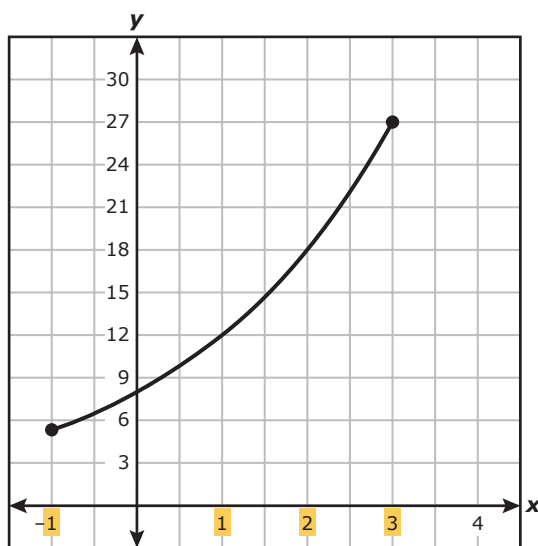**22** What are the solutions to $(x + 7)^2 = 81$?

F −74 and 88

G −2 and 16

H −88 and 74

J −16 and 2

---

23 What appears to be the domain of the part of the exponential function graphed on the grid?

A $-1 \leq x \leq 3$

B $-1 \leq y \leq 3$

C $5.3 \leq x \leq 27$

D $5.3 \leq y \leq 27$

24 The tables of ordered pairs represent some points on the graphs of lines q and v.

Line q

x	−9	−3	2
y	0	18	33

Line v

x	−4	0	10
y	10	8	3

Which system of equations is represented by lines q and v?

F $21x - y = 9$
   $5x + 6y = 40$

G $3x - y = -27$
   $x + 2y = 16$

H $21x - y = 9$
   $5x + 6y = 20$

J $9x - y = -27$
   $x + 2y = 8$

25 Which situation does NOT show causation?

    A When the student population at a school increases, the number of teachers at the school increases.

    B When the amount of sugar in a quart of apple juice is reduced, there are fewer calories in each serving.

    C When there are more workers on a project, the project is completed in less time.

    D When there is more protein in an athlete's diet, the athlete scores more points in a game.

---

26 Which function is equivalent to $f(x) = -4(x + 7)^2 - 6$?

    F $f(x) = -4x^2 - 56x - 202$

    G $f(x) = -4x^2 + 14x + 43$

    H $f(x) = -4x^2 - 56x - 172$

    J $f(x) = -4x^2 + 190$

GO ON

27 A paper airplane was thrown from the top of a tall building. The height of the paper airplane above the ground can be found using the function $y = -1.5x + 60$, where x is the time in seconds the airplane has been in the air.
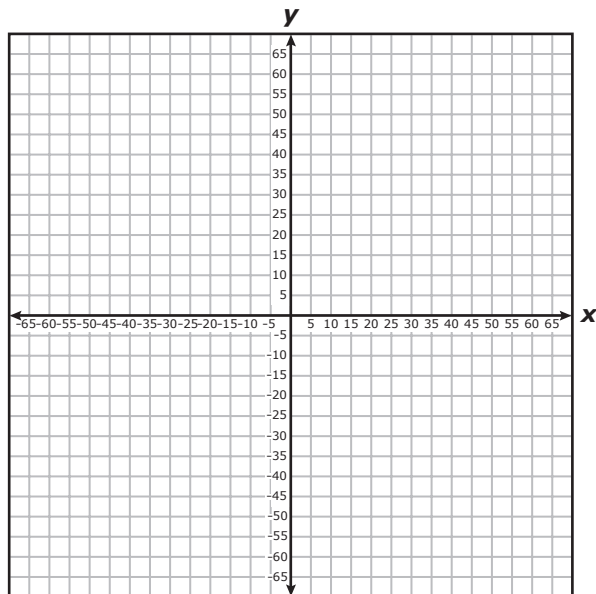
How many seconds did it take the paper airplane to reach the ground?

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

GO ON

28 Which expression is equivalent to $\dfrac{\left(q^4\right)^{-3}}{q^{-15}}$ for all values of q where the expression is defined?
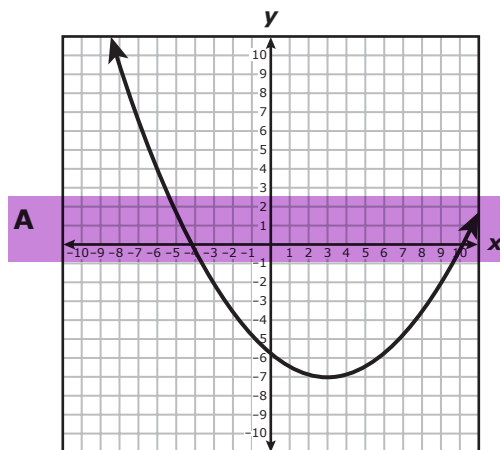
F q^{27}

G $\dfrac{1}{q^{27}}$

H q^3

J $\dfrac{1}{q^3}$

---

29 Which graph best represents a quadratic function that has only one zero?

GO ON
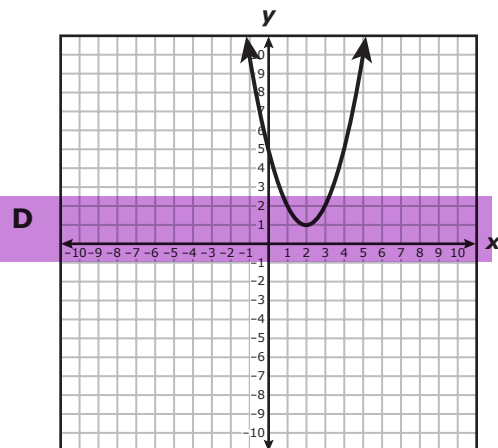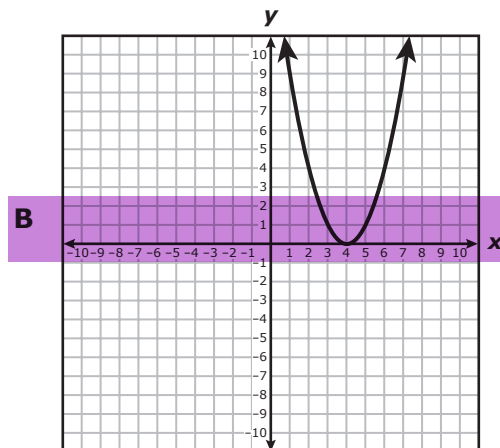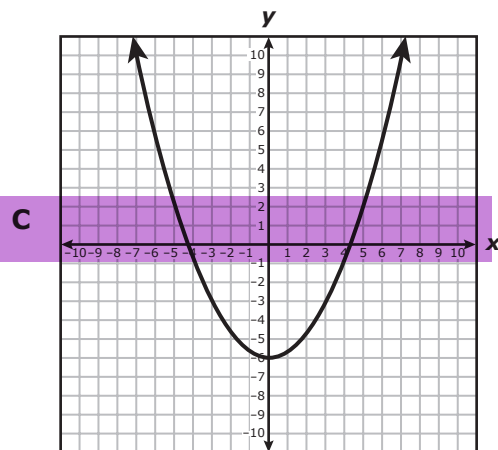
30 What is the solution set for $-4x + 10 \geq 5x + 55$?

F $x \geq 5$

G $x \geq 45$

H $x \leq -5$

J $x \leq -45$

---

31 Which expression is a factor of $21x^2 + 13x - 20$?
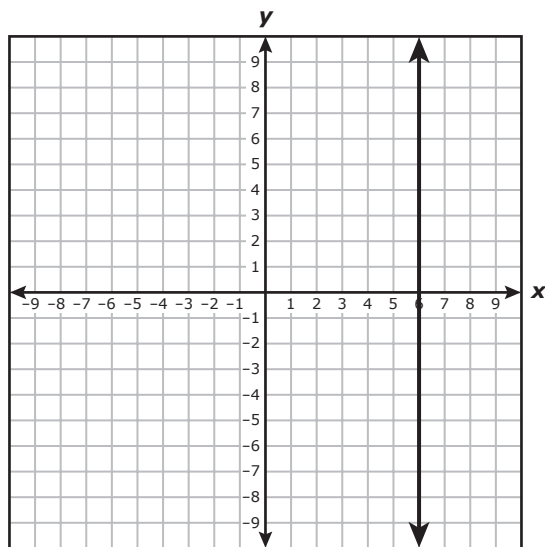
A $3x - 4$

B $7x - 5$

C $7x + 4$

D $3x + 5$

32 What are the equation and slope of the line shown on the grid?

F $y = 6$; slope is $-\dfrac{1}{6}$.

G $x = 6$; slope is zero.

H $y = 6$; slope is 6.

J $x = 6$; slope is undefined.

33 In the year 1900, the total number of metric tons of copper produced in the world was 495,000. Each year since 1900, the total number of metric tons of copper produced has increased on average by about 3.25% over the amount produced the previous year.

Which function models the total number of metric tons of copper produced in the year that is x years since 1900?

A $c(x) = 495{,}000(1.0325)^x$
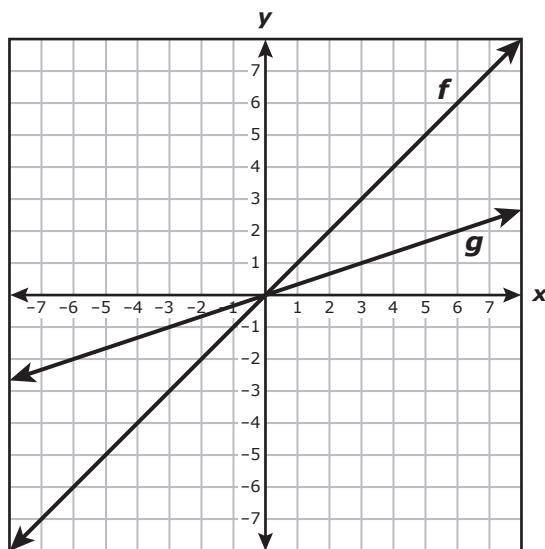
B $c(x) = 495{,}000(0.9675)^x$

C $c(x) = 495{,}000x^{1.0325}$

D $c(x) = 495{,}000x^{0.9675}$

---

34 What is the solution to $34x + 95 = 3(14x + 9)$?

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

35 The graphs of linear functions *f* and *g* are shown on the grid.

Which function is best represented by the graph of *g*?

A $g(x) = f(x) - 4$

B $g(x) = \frac{1}{3} f(x)$

C $g(x) = f(x) - 2$

D $g(x) = 3f(x)$

36 Which expression is equivalent to $(h^2 + 9h - 1)(-4h + 3)$?

F $-4h^3 - 33h^2 + 31h - 3$

G $4h^3 + 39h^2 - 23h - 3$

H $-4h^3 - 39h^2 + 23h + 3$

J $4h^3 + 33h^2 - 31h + 3$

---

37 There are 15 plates in a kitchen cabinet. The diameter of each plate is either 7 inches or 12 inches. The diameter of all 15 plates combined is 140 inches.

Which system of equations can be used to find the number of 7-inch plates, x, and the number of 12-inch plates, y, that are in the cabinet?
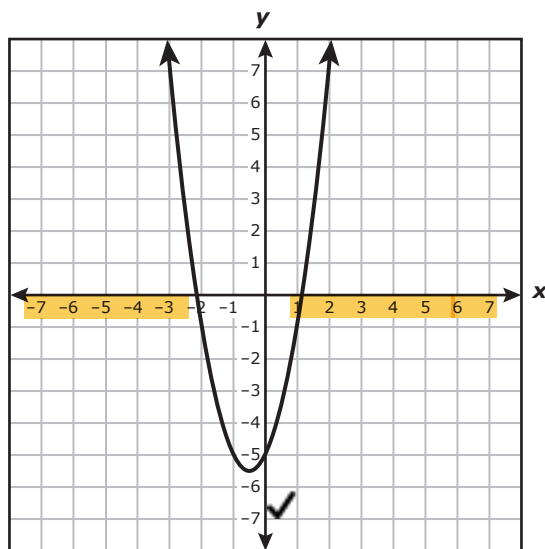
A $x + y = 140$
$12x + 7y = 15$

B $7x + 12y = 140$
$7x + 12y = 15$

C $x + y = 15$
$7x + 12y = 140$

D $x + y = 15$
$12x + 7y = 140$

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

Which of these best represents the domain of *f* ?

F $-3 \leq x \leq 2$

G All real numbers

H $y \geq 5.5$

J All real numbers less than -3 or greater than 2

---

39 What is the equation in slope-intercept form of the line that passes through the point $(2, -2)$ and is perpendicular to the line represented by $y = \dfrac{2}{5}x + 2$?

A $y = \dfrac{5}{2}x - 7$

B $y = \dfrac{5}{2}x + 7$

C $y = -\dfrac{5}{2}x - 3$

D $y = -\dfrac{5}{2}x + 3$

GO ON

40 Which graph best represents $f(x) = 2(5)^x$?

F

H

G

J

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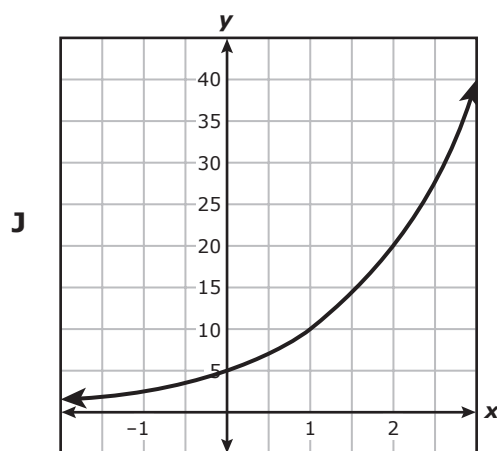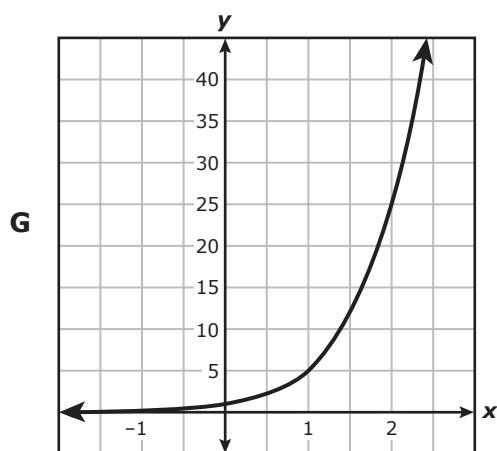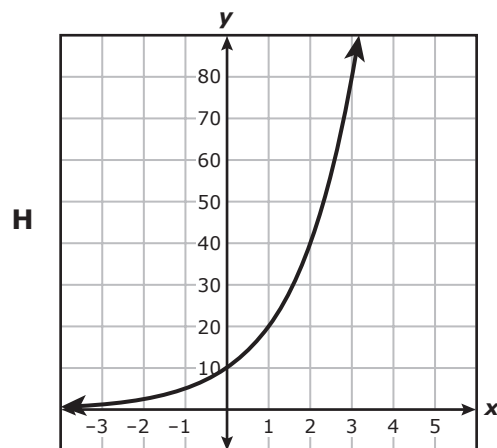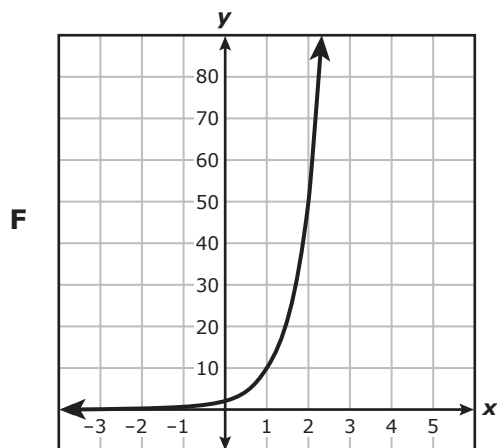
41 The area of a rectangular trampoline is $112\ \text{ft}^2$. The length of the trampoline is 6 ft greater than the width of the trampoline. This situation can be represented by the equation $w^2 + 6w - 112 = 0$.

What is the width of the trampoline in feet?

A 7 ft

B 16 ft

C 8 ft

D 14 ft

42 The table shows the linear relationship between the balance of a student's savings account and the number of weeks he has been saving.
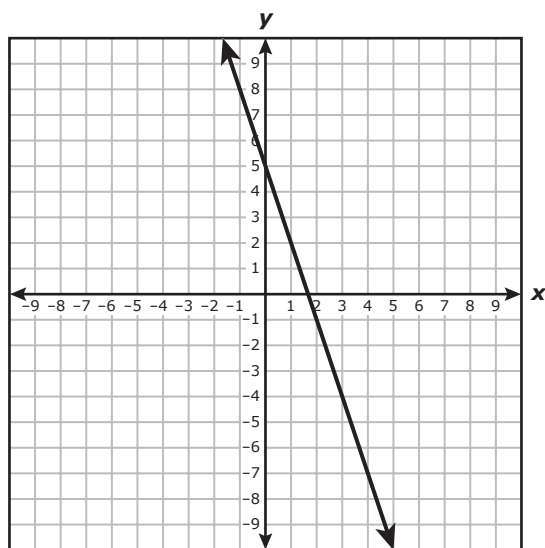
Savings Account

Week	0	1	3	6	8	13
Balance (dollars)	32	39	53	74	88	123

Based on the table, what was the rate of change of the balance of the student's savings account in dollars and cents per week?

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

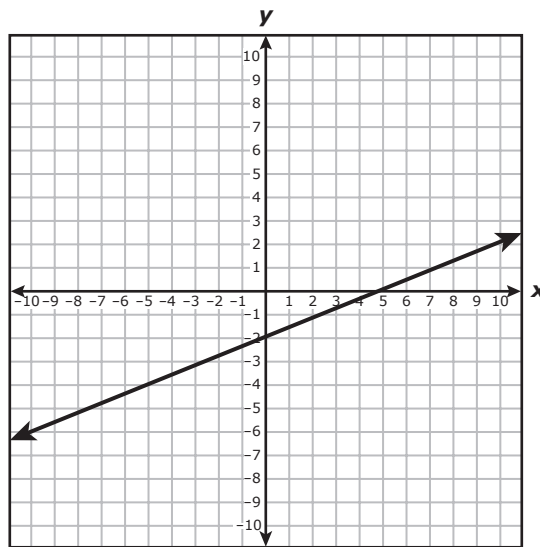**43** The graph of a linear function is shown on the grid.

Which equation is best represented by this graph?

A $y + 7 = -3(x - 4)$

B $y + 1 = -3(x + 2)$

C $y - 4 = 3(x + 7)$

D $y - 2 = 3(x - 1)$

GO ON

44 Which expression is a factor of $9r^2 - 4r + 1$?

    F $3r - 1$

    G $r - 1$

    H $9r - 1$

    J There are no real factors.

---

45 The graph of $2x - 5y = 10$ is shown on the grid.

Which ordered pair is in the solution set of $2x - 5y \geq 10$?

    A $(0, 5)$

    B $(5, 0)$

    C $(-2, 5)$

    D $(-5, 2)$

46 Scientists are studying a bacteria sample. The function $f(x) = 245(1.12)^x$ gives the number of bacteria in the sample at the end of x days.

Which statement is the best interpretation of one of the values in this function?

    F The initial number of bacteria is 12.

    G The initial number of bacteria decreases at a rate of 88% each day.

    H The number of bacteria increases at a rate of 12% each day.

    J The number of bacteria at the end of one day is 245.

---

47 The daily cost of hiring a plumber, y, to work x hours on a repair project can be modeled using a linear function. The plumber charges a fixed cost of $80 plus an additional cost of $45 per hour. The plumber works a maximum of 8 hours per day.

For one day of work, what is the range of the function for this situation?

    A $0 \leq x \leq 8$

    B $80 \leq y \leq 440$

   **C** $0 \leq x \leq 10$

    D $45 \leq y \leq 685$

---

48 The graph of $g(x) = x^2$ was transformed to create the graph of $h(x) = -\left(\dfrac{x}{4}\right)^2$. Which of these describes the transformation from the graph of g to the graph of h?

    F A reflection over the x-axis and a horizontal stretch

    G A reflection over the y-axis and a horizontal stretch

    H A reflection over the x-axis and a vertical stretch

    J A reflection over the y-axis and a vertical stretch

49 Which expression is equivalent to $\dfrac{10q^5w^7}{2w^3} \cdot \dfrac{4(q^6)^2}{w^{-5}}$ for all values of q and w where the

expression is defined?

A $\dfrac{32q^7}{w}$

B $20q^{17}w^9$

C $32q^7w^9$

D $20qw$

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50 A graph of a quadratic function is shown on the grid.
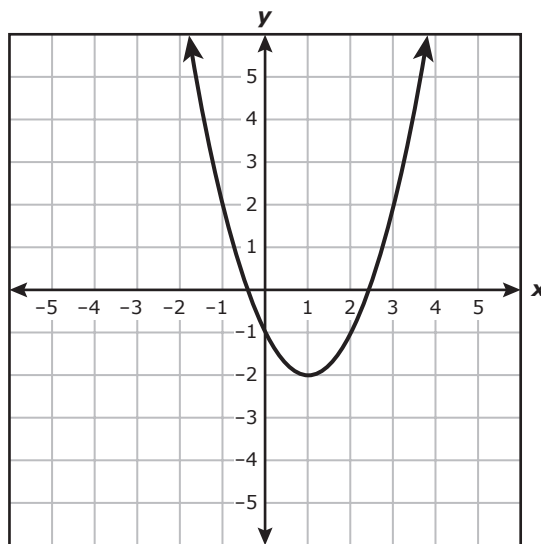
Which coordinates best represent the vertex of the graph?

F $(2.4, 0)$

G $(0, -1)$

H $(-0.4, 0)$

J $(1, -2)$

51 What is the slope of the line that passes through the points $(5, -11)$ and $(-9, 17)$?

    A -2

    B $-\dfrac{1}{2}$

    C 7

    D 2

---

52 What is the *x*-value of the solution to this system of equations?

$$x = 2y - 4$$
$$7x + 5y = -66$$

    F -2

    G $-\dfrac{19}{7}$

    H -8

    J $-\dfrac{62}{19}$

---

53 Which expression is equivalent to $\sqrt{96}$?

    A 24

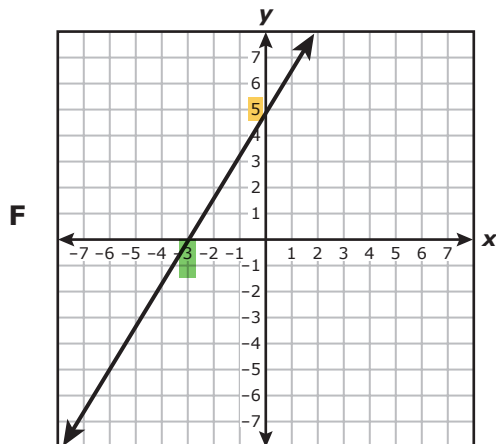   **B** $8\sqrt{6}$

    C 48

    D $4\sqrt{6}$

54 Which line appears to have an *x*-intercept of −5 and a *y*-intercept of 3?

F

H

G

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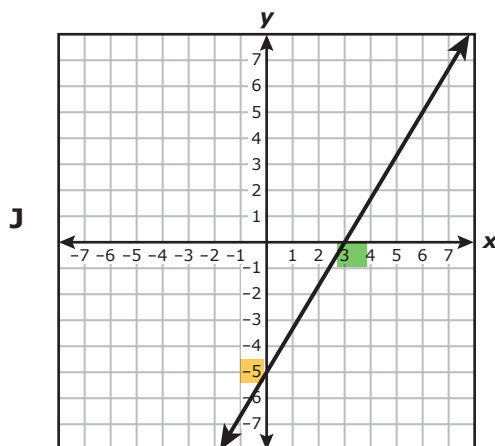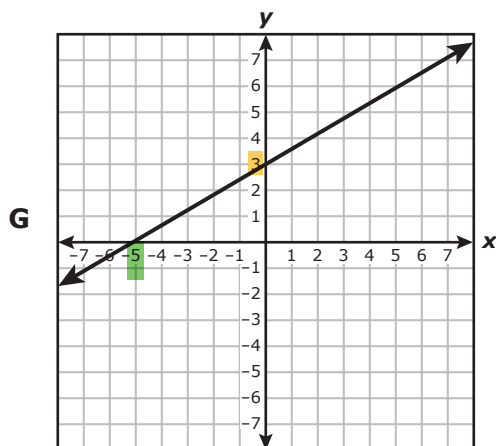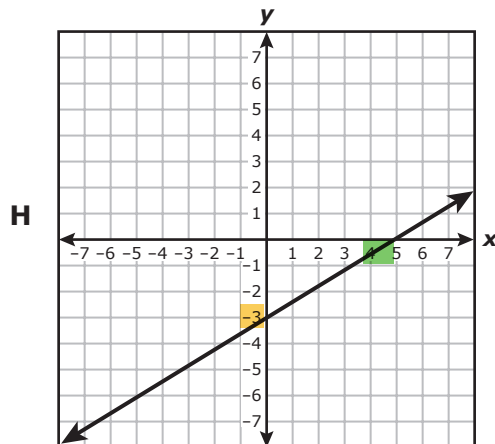
BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS
ON THE ANSWER DOCUMENT.

STOP

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