# JMAP
# REGENTS BY TYPE

The NY Algebra I Regents Exams Questions
from Spring 2013 to August 2022 Sorted by Type

www.jmap.org

# Algebra I Multiple Choice Regents Exam Questions

1 Which statement is true about the quadratic functions $g(x)$, shown in the table below, and $f(x) = (x-3)^2 + 2$?

| x | g(x) |
|---|------|
| 0 | 4 |
| 1 | −1 |
| 2 | −4 |
| 3 | −5 |
| 4 | −4 |
| 5 | −1 |
| 6 | 4 |

1) They have the same vertex.
2) They have the same zeros.
3) They have the same axis of symmetry.
4) They intersect at two points.

2 Bella recorded data and used her graphing calculator to find the equation for the line of best fit. She then used the correlation coefficient to determine the strength of the linear fit. Which correlation coefficient represents the strongest linear relationship?
1) 0.9
2) 0.5
3) -0.3
4) -0.8

3 Which polynomial function has zeros at −3, 0, and 4?
1) $f(x) = (x+3)(x^2+4)$
2) $f(x) = (x^2-3)(x-4)$
3) $f(x) = x(x+3)(x-4)$
4) $f(x) = x(x-3)(x+4)$

4 Which expression is equivalent to $16x^4 - 64$?
1) $(4x^2-8)^2$
2) $(8x^2-32)^2$
3) $(4x^2+8)(4x^2-8)$
4) $(8x^2+32)(8x^2-32)$

5 Mrs. Rossano asked her students to explain why $(3,-4)$ is a solution to $2y+3x = 1$. Three student responses are given below.
Andrea:
"When the equation is graphed on a calculator, the point can be found within its table."
Bill:
"Substituting $x = 3$ and $y = -4$ into the equation makes it true."
Christine:
"The graph of the line passes through the point $(3,-4)$."
 Which students are correct?
1) Andrea and Bill, only
2) Bill and Christine, only
3) Andrea and Christine, only
4) Andrea, Bill, and Christine

6  A public opinion poll was taken to explore the relationship between age and support for a candidate in an election. The results of the poll are summarized in the table below.

| Age | For | Against | No Opinion |
|---|---|---|---|
| 21-40 | 30 | 12 | 8 |
| 41-60 | 20 | 40 | 15 |
| Over 60 | 25 | 35 | 15 |

What percent of the 21-40 age group was for the candidate?
1)  15
2)  25
3)  40
4)  60

7  The graphs of the functions $f(x) = |x - 3| + 1$ and $g(x) = 2x + 1$ are drawn. Which statement about these functions is true?
1)  The solution to $f(x) = g(x)$ is 3.
2)  The solution to $f(x) = g(x)$ is 1.
3)  The graphs intersect when $y = 1$.
4)  The graphs intersect when $x = 3$.

8  In the functions $f(x) = kx^2$ and $g(x) = |kx|$, $k$ is a positive integer. If $k$ is replaced by $\frac{1}{2}$, which statement about these new functions is true?
1)  The graphs of both $f(x)$ and $g(x)$ become wider.
2)  The graph of $f(x)$ becomes narrower and the graph of $g(x)$ shifts left.
3)  The graphs of both $f(x)$ and $g(x)$ shift vertically.
4)  The graph of $f(x)$ shifts left and the graph of $g(x)$ becomes wider.

9  What is the solution of the equation $2(x + 2)^2 - 4 = 28$?
1)  6, only
2)  2, only
3)  2 and −6
4)  6 and −2

10  Which scenario represents exponential growth?
1)  A water tank is filled at a rate of 2 gallons/minute.
2)  A vine grows 6 inches every week.
3)  A species of fly doubles its population every month during the summer.
4)  A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

11  Morgan throws a ball up into the air. The height of the ball above the ground, in feet, is modeled by the function $h(t) = -16t^2 + 24t$, where $t$ represents the time, in seconds, since the ball was thrown. What is the appropriate domain for this situation?
1)  $0 \le t \le 1.5$
2)  $0 \le t \le 9$
3)  $0 \le h(t) \le 1.5$
4)  $0 \le h(t) \le 9$

12  The line represented by the equation $4y + 2x = 33.6$ shares a solution point with the line represented by the table below.

| x | y |
|---|---|
| −5 | 3.2 |
| −2 | 3.8 |
| 2 | 4.6 |
| 4 | 5 |
| 11 | 6.4 |

The solution for this system is
1)  $(-14.0, -1.4)$
2)  $(-6.8, 5.0)$
3)  $(1.9, 4.6)$
4)  $(6.0, 5.4)$

13  Grisham is considering the three situations below.
I.  For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.
II.  The value of a car depreciates at a rate of 15% per year after it is purchased.
III.  The amount of bacteria in a culture triples every two days during an experiment.
Which of the statements describes a situation with an equal difference over an equal interval?
1)  I, only
2)  II, only
3)  I and III
4)  II and III

14  If $f(x) = \frac{1}{2}x^2 - \left(\frac{1}{4}x + 3\right)$, what is the value of $f(8)$?
1)  11
2)  17
3)  27
4)  33

15  The Ebola virus has an infection rate of 11% per day as compared to the SARS virus, which has a rate of 4% per day.  If there were one case of Ebola and 30 cases of SARS initially reported to authorities and cases are reported each day, which statement is true?
1)  At day 10 and day 53 there are more Ebola cases.
2)  At day 10 and day 53 there are more SARS cases.
3)  At day 10 there are more SARS cases, but at day 53 there are more Ebola cases.
4)  At day 10 there are more Ebola cases, but at day 53 there are more SARS cases.

16  The acidity in a swimming pool is considered normal if the average of three pH readings, $p$, is defined such that $7.0 < p < 7.8$.  If the first two readings are 7.2 and 7.6, which value for the third reading will result in an overall rating of normal?
1)  6.2
2)  7.3
3)  8.6
4)  8.8

3

17 The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?

| Year | 1898 | 1971 | 1985 | 2006 | 2012 |
|------|------|------|------|------|------|
| Cost (¢) | 1 | 6 | 14 | 24 | 35 |

1) 1898-1971      3) 1985-2006
2) 1971-1985      4) 2006-2012

18 The table below shows the year and the number of households in a building that had high-speed broadband internet access.

| Number of Households | 11 | 16 | 23 | 33 | 42 | 47 |
|------|------|------|------|------|------|------|
| Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |

For which interval of time was the average rate of change the *smallest*?
1) 2002 - 2004      3) 2004 - 2006
2) 2003 - 2005      4) 2005 - 2007

19 What is the solution set of the equation $(x-2)(x-a)=0$?
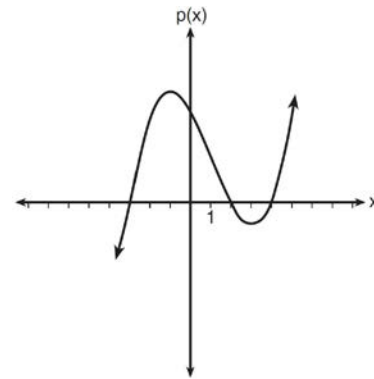1) $-2$ and $a$
2) $-2$ and $-a$
3) $2$ and $a$
4) $2$ and $-a$

20 Which of the equations below have the same solution?

I.     $10(x-5)=-15$
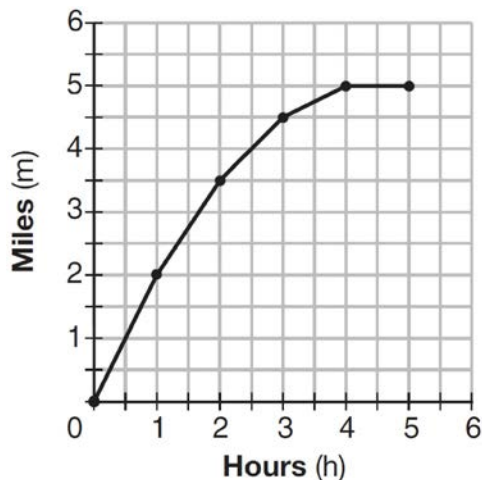
II.    $4+2(x-2)=9$

III.   $\frac{1}{3}x=\frac{3}{2}$

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

21 Based on the graph below, which expression is a possible factorization of $p(x)$?



1) $(x+3)(x-2)(x-4)$
2) $(x-3)(x+2)(x+4)$
3) $(x+3)(x-5)(x-2)(x-4)$
4) $(x-3)(x+5)(x+2)(x+4)$

22  The graph below shows the distance in miles, $m$, hiked from a camp in $h$ hours.



Which hourly interval had the greatest rate of change?
1)  hour 0 to hour 1
2)  hour 1 to hour 2
3)  hour 2 to hour 3
4)  hour 3 to hour 4

23  The formula for the surface area of a right rectangular prism is $A = 2lw + 2hw + 2lh$, where $l$, $w$, and $h$ represent the length, width, and height, respectively. Which term of this formula is *not* dependent on the height?
1)  $A$
2)  $2lw$
3)  $2hw$
4)  $2lh$

24  Given the relation $R = \{(-4,2),(3,6),(x,8),(-1,4)\}$
Which value of $x$ would make this relation a function?
1)  $-4$
2)  $-1$
3)  $3$
4)  $0$

25  Vinny collects population data, $P(h)$, about a specific strain of bacteria over time in hours, $h$, as shown in the graph below.
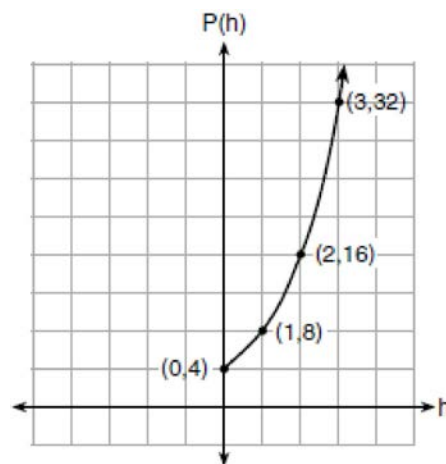


Which equation represents the graph of $P(h)$?
1)  $P(h) = 4(2)^h$
2)  $P(h) = \dfrac{46}{5}h + \dfrac{6}{5}$
3)  $P(h) = 3h^2 + 0.2h + 4.2$
4)  $P(h) = \dfrac{2}{3}h^3 - h^2 + 3h + 4$

26  What is the largest integer, $x$, for which the value of $f(x) = 5x^4 + 30x^2 + 9$ will be greater than the value of $g(x) = 3^x$?
1)  7
2)  8
3)  9
4)  10

27  As $x$ increases beyond 25, which function will have the largest value?
1)  $f(x) = 1.5^x$
2)  $g(x) = 1.5x + 3$
3)  $h(x) = 1.5x^2$
4)  $k(x) = 1.5x^3 + 1.5x^2$

28 A graph of average resting heart rates is shown below. The average resting heart rate for adults is 72 beats per minute, but doctors consider resting rates from 60-100 beats per minute within normal range.

**Average Resting Heart Rate by Age**
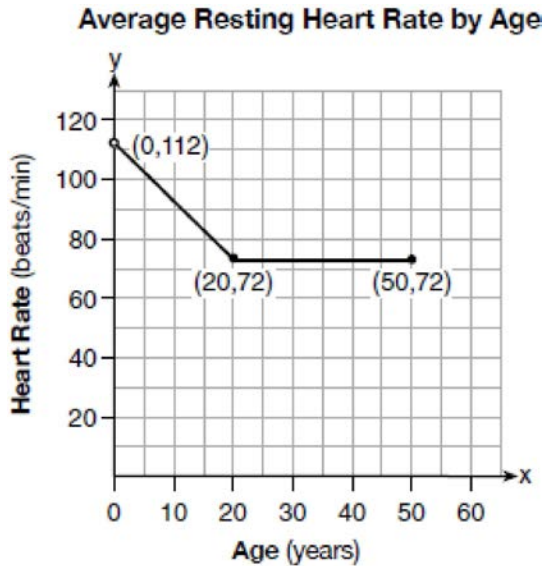


Which statement about average resting heart rates is *not* supported by the graph?
1) A 10-year-old has the same average resting heart rate as a 20-year-old.
2) A 20-year-old has the same average resting heart rate as a 30-year-old.
3) A 40-year-old may have the same average resting heart rate for ten years.
4) The average resting heart rate for teenagers steadily decreases.

29 The range of the function defined as $y = 5^x$ is
1) $y < 0$
2) $y > 0$
3) $y \leq 0$
4) $y \geq 0$

30 Noah conducted a survey on sports participation. He created the following two dot plots to represent the number of students participating, by age, in soccer and basketball.



Soccer Players' Ages



Basketball Players' Ages
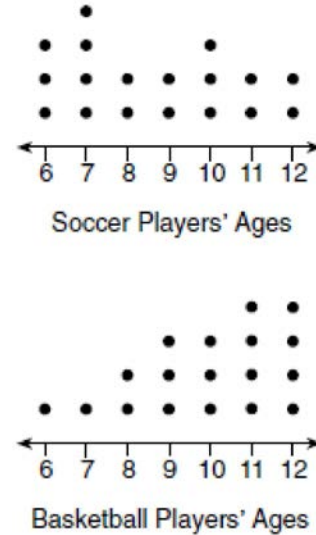
Which statement about the given data sets is correct?
1) The data for soccer players are skewed right.
2) The data for soccer players have less spread than the data for basketball players.
3) The data for basketball players have the same median as the data for soccer players.
4) The data for basketball players have a greater mean than the data for soccer players.

31 The zeros of the function $f(x) = x^2 - 5x - 6$ are
1) −1 and 6
2) 1 and −6
3) 2 and −3
4) −2 and 3

6

32  At Berkeley Central High School, a survey was conducted to see if students preferred cheeseburgers, pizza, or hot dogs for lunch.  The results of this survey are shown in the table below.

|  | Cheeseburgers | Pizza | Hot Dogs |
|---|---|---|---|
| Females | 32 | 44 | 24 |
| Males | 36 | 30 | 34 |

Based on this survey, what percent of the students preferred pizza?
1)   30
2)   37
3)   44
4)   74

33  Given the function $f(n)$ defined by the following:
$$f(1) = 2$$
$$f(n) = -5f(n-1) + 2$$
Which set could represent the range of the function?
1)   $\{2, 4, 6, 8, \dots\}$
2)   $\{2, -8, 42, -208, \dots\}$
3)   $\{-8, -42, -208, 1042, \dots\}$
4)   $\{-10, 50, -250, 1250, \dots\}$

34  Which situation could be modeled as a linear equation?
1)   The value of a car decreases by 10% every year.
2)   The number of fish in a lake doubles every 5 years.
3)   Two liters of water evaporate from a pool every day.
4)   The amount of caffeine in a person's body decreases by $\frac{1}{3}$ every 2 hours.

35  Nancy works for a company that offers two types of savings plans.  Plan $A$ is represented on the graph below.
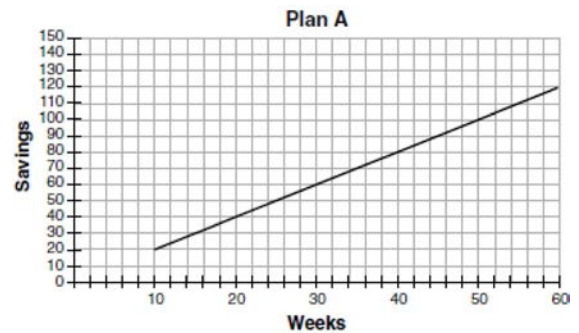


Plan $B$ is represented by the function $f(x) = 0.01 + 0.05x^2$, where $x$ is the number of weeks.  Nancy wants to have the highest savings possible after a year.  Nancy picks Plan $B$.  Her decision is
1)   correct, because Plan $B$ is an exponential function and will increase at a faster rate
2)   correct, because Plan $B$ is a quadratic function and will increase at a faster rate
3)   incorrect, because Plan $A$ will have a higher value after 1 year
4)   incorrect, because Plan $B$ is a quadratic function and will increase at a slower rate

7

36 A quadratic function and a linear function are graphed on the same set of axes. Which situation is *not* possible?
1) The graphs do not intersect.
2) The graphs intersect in one point.
3) The graphs intersect in two points.
4) The graphs intersect in three points.

37 In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?
1) $a_1 = 49;\ a_n = a_{n-1} + 21$
2) $a_1 = 0;\ a_n = 49a_{n-1} + 21$
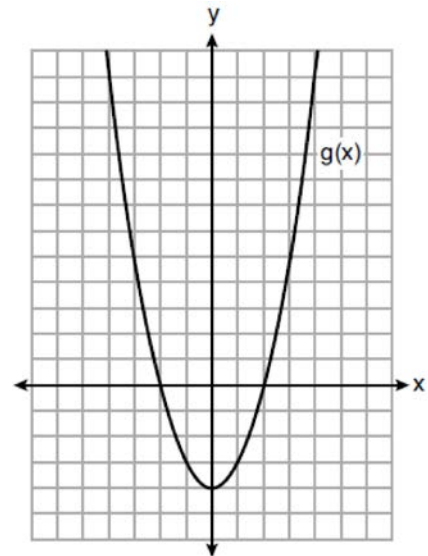3) $a_1 = 21;\ a_n = a_{n-1} + 49$
4) $a_1 = 0;\ a_n = 21a_{n-1} + 49$

38 Which expression is equivalent to $16x^2 - 36$?
1) $4(2x - 3)(2x - 3)$
2) $4(2x + 3)(2x - 3)$
3) $(4x - 6)(4x - 6)$
4) $(4x + 6)(4x + 6)$

39 What is the solution to $2h + 8 > 3h - 6$
1) $h < 14$
2) $h < \dfrac{14}{5}$
3) $h > 14$
4) $h > \dfrac{14}{5}$

40 Which statement is true about the functions $f(x)$ and $g(x)$, given below?



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

1) The minimum value of $g(x)$ is greater than the maximum value of $f(x)$.
2) $f(x)$ and $g(x)$ have the same y-intercept.
3) $f(x)$ and $g(x)$ have the same roots.
4) $f(x) = g(x)$ when $x = -4$.

41 Peter has $100 to spend on drinks for his party. Bottles of lemonade cost $2 each, and juice boxes cost $0.50 each. If $x$ is the number of bottles of lemonade and $y$ is the number of juice boxes, which inequality models this situation?
1) $0.50x + 2y \le 100$
2) $0.50x + 2y \ge 100$
3) $2x + 0.50y \le 100$
4) $2x + 0.50y \ge 100$

42 When solving the equation $x^2 - 8x - 7 = 0$ by completing the square, which equation is a step in the process?

1) $(x - 4)^2 = 9$

2) $(x - 4)^2 = 23$

3) $(x - 8)^2 = 9$

4) $(x - 8)^2 = 23$

43 Which equation and ordered pair represent the correct vertex form and vertex for $j(x) = x^2 - 12x + 7$?

1) $j(x) = (x - 6)^2 + 43,\ (6, 43)$

2) $j(x) = (x - 6)^2 + 43,\ (-6, 43)$

3) $j(x) = (x - 6)^2 - 29,\ (6, -29)$

4) $j(x) = (x - 6)^2 - 29,\ (-6, -29)$

44 Which recursively defined function represents the sequence $3, 7, 15, 31, \ldots$?

1) $f(1) = 3,\ f(n + 1) = 2^{f(n)} + 3$

2) $f(1) = 3,\ f(n + 1) = 2^{f(n)} - 1$

3) $f(1) = 3,\ f(n + 1) = 2f(n) + 1$

4) $f(1) = 3,\ f(n + 1) = 3f(n) - 2$

45 Which expression is equivalent to $36x^2 - 100$?

1) $4(3x - 5)(3x - 5)$

2) $4(3x + 5)(3x - 5)$

3) $2(9x - 25)(9x - 25)$

4) $2(9x + 25)(9x - 25)$

46 The scatterplot below compares the number of bags of popcorn and the number of sodas sold at each performance of the circus over one week.

**Popcorn Sales and Soda Sales**
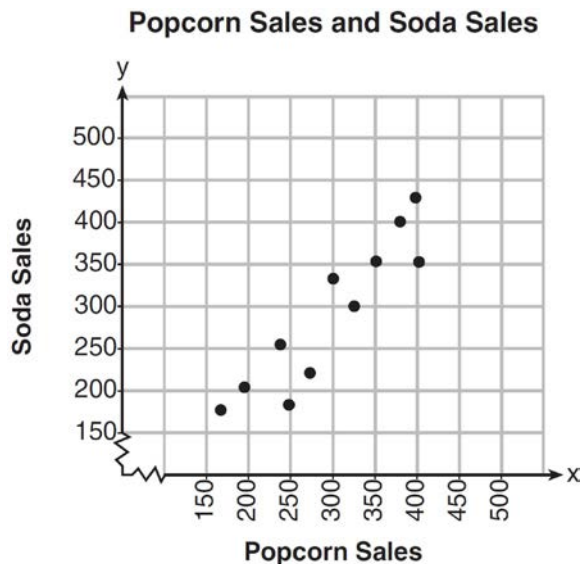


Which conclusion can be drawn from the scatterplot?

1) There is a negative correlation between popcorn sales and soda sales.

2) There is a positive correlation between popcorn sales and soda sales.

3) There is no correlation between popcorn sales and soda sales.

4) Buying popcorn causes people to buy soda.

47 Which expression is *not* equivalent to $\left(5^{2x}\right)^3$?

1) $\left(5^x\right)^6$

2) $\left(5^{3x}\right)^2$

3) $\left(5^5\right)^x$

4) $\left(5^2\right)^{3x}$

9

48 The formula for blood flow rate is given by $F = \dfrac{p_1 - p_2}{r}$, where $F$ is the flow rate, $p_1$ the initial pressure, $p_2$ the final pressure, and $r$ the resistance created by blood vessel size. Which formula can *not* be derived from the given formula?

1) $p_1 = Fr + p_2$
2) $p_2 = p_1 - Fr$
3) $r = F(p_2 - p_1)$
4) $r = \dfrac{p_1 - p_2}{F}$

49 Which system of equations has the same solutions as the system below?

$$3x - y = 7$$
$$2x + 3y = 12$$

1) $6x - 2y = 14$
   $-6x + 9y = 36$
2) $18x - 6y = 42$
   $4x + 6y = 24$
3) $-9x - 3y = -21$
   $2x + 3y = 12$
4) $3x - y = 7$
   $x + y = 2$

50 Which polynomial has a leading coefficient of 4 and a degree of 3?

1) $3x^4 - 2x^2 + 4x - 7$
2) $4 + x - 4x^2 + 5x^3$
3) $4x^4 - 3x^3 + 2x^2$
4) $2x + x^2 + 4x^3$

51 An ice cream shop sells ice cream cones, $c$, and milkshakes, $m$. Each ice cream cone costs \$1.50 and each milkshake costs \$2.00. Donna has \$19.00 to spend on ice cream cones and milkshakes. If she must buy 5 ice cream cones, which inequality could be used to determine the maximum number of milkshakes she can buy?

1) $1.50(5) + 2.00m \geq 19.00$
2) $1.50(5) + 2.00m \leq 19.00$
3) $1.50c + 2.00(5) \geq 19.00$
4) $1.50c + 2.00(5) \leq 19.00$

52 What is the domain of the relation shown below?
$$\{(4,2),(1,1),(0,0),(1,-1),(4,-2)\}$$

1) $\{0,1,4\}$
2) $\{-2,-1,0,1,2\}$
3) $\{-2,-1,0,1,2,4\}$
4) $\{-2,-1,0,0,1,1,1,2,4,4\}$

53 Which value would be a solution for $x$ in the inequality $47 - 4x < 7$?

1) $-13$
2) $-10$
3) $10$
4) $11$

54 What is the product of $2x + 3$ and $4x^2 - 5x + 6$?

1) $8x^3 - 2x^2 + 3x + 18$
2) $8x^3 - 2x^2 - 3x + 18$
3) $8x^3 + 2x^2 - 3x + 18$
4) $8x^3 + 2x^2 + 3x + 18$

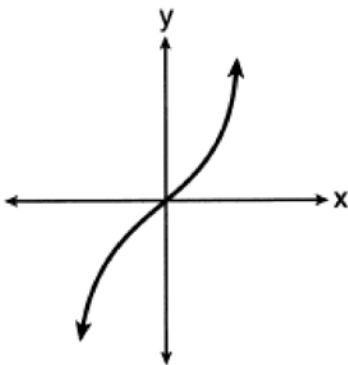55 In an organism, the number of cells, $C(d)$, after $d$ days can be represented by the function $C(d) = 120 \bullet 2^{3d}$. This function can also be expressed as

1) $C(d) = 240^{3d}$
2) $C(d) = 960 \bullet 2^{d}$
3) $C(d) = 120 \bullet 6^{d}$
4) $C(d) = 120 \bullet 8^{d}$

56 Which relation is a function?
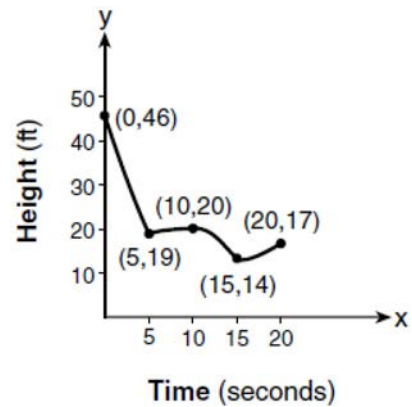
| x | y |
|---|---|
| −1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 1 | 2 |
| 2 | 4 |
| 3 | 9 |

1)

2) $y = \begin{cases} x, & -1 < x \le 2 \\ x^2, & 2 \le x < 4 \end{cases}$



3)

4) $\{(0,1),(2,3),(3,2),(3,4)\}$

57 The graph below models the height of a remote-control helicopter over 20 seconds during flight.



Over which interval does the helicopter have the *slowest* average rate of change?

1) 0 to 5 seconds
2) 5 to 10 seconds
3) 10 to 15 seconds
4) 15 to 20 seconds

58 In the equation $A = P(1 \pm r)^t$, $A$ is the total amount, $P$ is the principal amount, $r$ is the annual interest rate, and $t$ is the time in years. Which statement correctly relates information regarding the annual interest rate for each given equation?

1) For $A = P(1.025)^t$, the principal amount of money is increasing at a 25% interest rate.
2) For $A = P(1.0052)^t$, the principal amount of money is increasing at a 52% interest rate.
3) For $A = P(0.86)^t$, the principal amount of money is decreasing at a 14% interest rate.
4) For $A = P(0.68)^t$, the principal amount of money is decreasing at a 68% interest rate.

11

59 The formula $Ax + By = C$ represents the equation of a line in standard form. Which expression represents $y$ in terms of $A$, $B$, $C$, and $x$?

1) $\dfrac{C - Ax}{B}$

2) $\dfrac{C - A}{Bx}$

3) $\dfrac{C - A}{x + B}$

4) $\dfrac{C - B}{Ax}$

60 Which pair of equations could *not* be used to solve the following equations for $x$ and $y$?
$$4x + 2y = 22$$
$$-2x + 2y = -8$$

1) $4x + 2y = 22$
   $2x - 2y = 8$

2) $4x + 2y = 22$
   $-4x + 4y = -16$

3) $12x + 6y = 66$
   $6x - 6y = 24$

4) $8x + 4y = 44$
   $-8x + 8y = -8$

61 What is the solution to the inequality $2 + \dfrac{4}{9}x \geq 4 + x$?

1) $x \leq -\dfrac{18}{5}$

2) $x \geq -\dfrac{18}{5}$

3) $x \leq \dfrac{54}{5}$

4) $x \geq \dfrac{54}{5}$

62 Which expression is equivalent to $(-4x^2)^3$?

1) $-12x^6$

2) $-12x^5$

3) $-64x^6$

4) $-64x^5$

63 Which statistic can *not* be determined from a box plot representing the scores on a math test in Mrs. DeRidder's algebra class?

1) the lowest score

2) the median score

3) the highest score

4) the score that occurs most frequently

64 The function $f(x) = 3x^2 + 12x + 11$ can be written in vertex form as

1) $f(x) = (3x + 6)^2 - 25$

2) $f(x) = 3(x + 6)^2 - 25$

3) $f(x) = 3(x + 2)^2 - 1$

4) $f(x) = 3(x + 2)^2 + 7$

65 Which expression is equivalent to $18x^2 - 50$?

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

2) $2(3x - 5)^2$

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

4) $2(3x - 25)(3x + 25)$

66 When $3x + 2 \leq 5(x - 4)$ is solved for $x$, the solution is

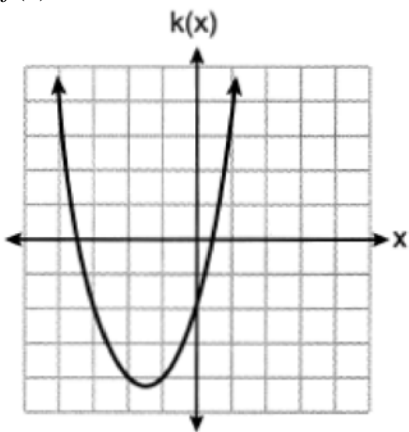1) $x \leq 3$

2) $x \geq 3$

3) $x \leq -11$

4) $x \geq 11$

67 Which function has the *smallest* y-intercept?
   1) $g(x) = 2x - 6$
   2)

   | x | h(x) |
   |---|------|
   | -2 | $\frac{1}{4}$ |
   | -1 | $\frac{1}{2}$ |
   | 0 | 1 |
   | 1 | 2 |
   | 2 | 4 |

   3) $f(x) = \sqrt{x} - 2$

   k(x)

   

   4)

68 Given the following expressions:

   I. $-\frac{5}{8} + \frac{3}{5}$       III. $\left(\sqrt{5}\right) \cdot \left(\sqrt{5}\right)$

   II. $\frac{1}{2} + \sqrt{2}$       IV. $3 \cdot \left(\sqrt{49}\right)$

   Which expression(s) result in an irrational number?
   1) II, only
   2) III, only
   3) I, III, IV
   4) II, III, IV

69 The expression $\frac{1}{3}x(6x^2 - 3x + 9)$ is equivalent to
   1) $2x^2 - x + 3$
   2) $2x^2 + 3x + 3$
   3) $2x^3 - x^2 + 3x$
   4) $2x^3 + 3x^2 + 3x$

70 At Benny's Cafe, a mixed-greens salad costs \$5.75.
   Additional toppings can be added for \$0.75 each.
   Which function could be used to determine the
   cost, $c(s)$, in dollars, of a salad with $s$ additional
   toppings?
   1) $c(s) = 5.75s + 0.75$
   2) $c(s) = 0.75s + 5.75$
   3) $c(s) = 5.00s + 0.75$
   4) $c(s) = 0.75s + 5.00$

71 Which point is a solution to the system below?
   $$2y < -12x + 4$$
   $$y < -6x + 4$$
   1) $\left(1, \frac{1}{2}\right)$
   2) $(0, 6)$
   3) $\left(-\frac{1}{2}, 5\right)$
   4) $(-3, 2)$

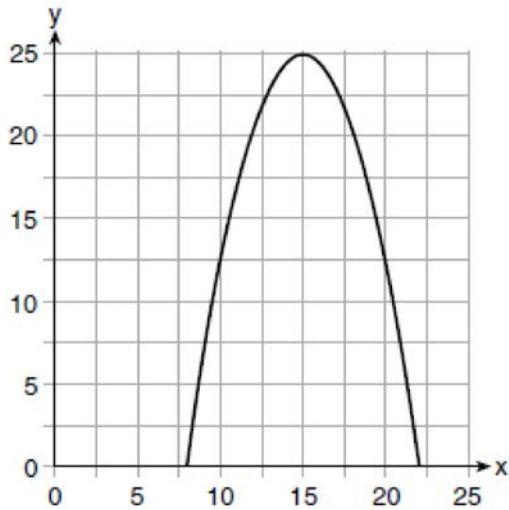72 A recursively defined sequence is shown below.
   $$a_1 = 5$$
   $$a_{n+1} = 2a_n - 7$$
   The value of $a_4$ is
   1) -9
   2) -1
   3) 8
   4) 15

13

73  The graph of a quadratic function is shown below.



An equation that represents the function could be

1)  $q(x) = \dfrac{1}{2}(x+15)^2 - 25$

2)  $q(x) = -\dfrac{1}{2}(x+15)^2 - 25$

3)  $q(x) = \dfrac{1}{2}(x-15)^2 + 25$

4)  $q(x) = -\dfrac{1}{2}(x-15)^2 + 25$

74  Anne invested $1000 in an account with a 1.3% annual interest rate.  She made no deposits or withdrawals on the account for 2 years.  If interest was compounded annually, which equation represents the balance in the account after the 2 years?

1)  $A = 1000(1-0.013)^2$

2)  $A = 1000(1+0.013)^2$

3)  $A = 1000(1-1.3)^2$

4)  $A = 1000(1+1.3)^2$

75  The diagram below shows the graph of $h(t)$, which models the height, in feet, of a rocket $t$ seconds after it was shot into the air.
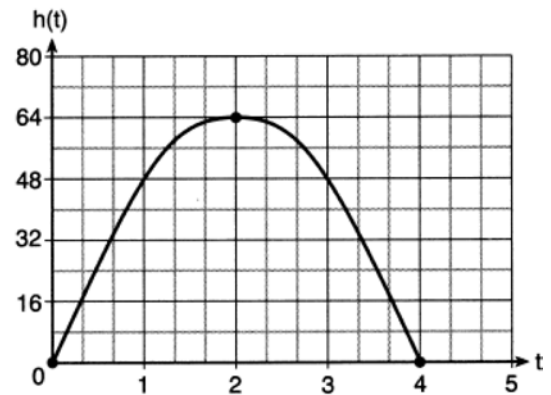


The domain of $h(t)$ is
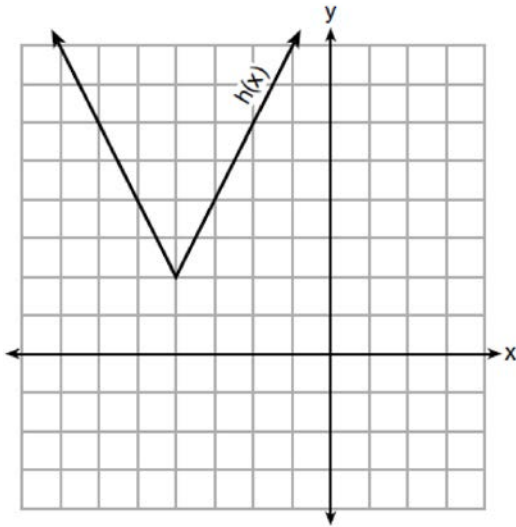
1)  $(0,4)$

2)  $[0,4]$

3)  $(0,64)$

4)  $[0,64]$

76  When written in standard form, the product of $(3+x)$ and $(2x-5)$ is

1)  $3x-2$

2)  $2x^2 + x - 15$

3)  $2x^2 - 11x - 15$

4)  $6x - 15 + 2x^2 - 5x$

77  What are the zeros of $f(x) = (2x-4)(3x+4)$?

1)  $\left\{-\dfrac{4}{3}, 2\right\}$

2)  $\{-4,4\}$

3)  $\left\{-2, \dfrac{4}{3}\right\}$

4)  $\{-4,2\}$

14

78 The function $h(x)$, which is graphed below, and the function $g(x) = 2|x + 4| - 3$ are given.



Which statements about these functions are true?
I.   $g(x)$ has a lower minimum value than $h(x)$.
II.  For all values of $x$, $h(x) < g(x)$.
III. For any value of $x$, $g(x) \neq h(x)$.
1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

79 The highest possible grade for a book report is 100. The teacher deducts 10 points for each day the report is late. Which kind of function describes this situation?
1) linear
2) quadratic
3) exponential growth
4) exponential decay

80 What is the solution to $\frac{3}{2}b + 5 < 17$?
1) $b < 8$
2) $b > 8$
3) $b < 18$
4) $b > 18$

81 A sequence of blocks is shown in the diagram below.
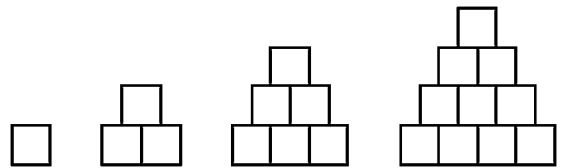


This sequence can be defined by the recursive function $a_1 = 1$ and $a_n = a_{n-1} + n$. Assuming the pattern continues, how many blocks will there be when $n = 7$?
1) 13
2) 21
3) 28
4) 36

82 Michael borrows money from his uncle, who is charging him simple interest using the formula $I = Prt$. To figure out what the interest rate, $r$, is, Michael rearranges the formula to find $r$. His new formula is $r$ equals
1) $\dfrac{I - P}{t}$
2) $\dfrac{P - I}{t}$
3) $\dfrac{I}{Pt}$
4) $\dfrac{Pt}{I}$

15

83 Which system has the same solution as the system below?
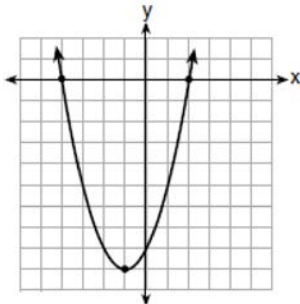
$$x + 3y = 10$$

$$-2x - 2y = 4$$

1) $-x + y = 6$

$2x + 6y = 20$

2) $-x + y = 14$

$2x + 6y = 20$

3) $x + y = 6$

$2x + 6y = 20$

4) $x + y = 14$

$2x + 6y = 20$

84 Which function has zeros of -4 and 2?

1) $f(x) = x^2 + 7x - 8$
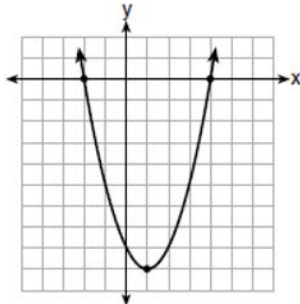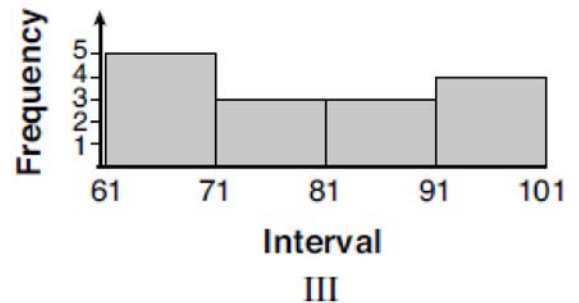
2) 

3) $g(x) = x^2 - 7x - 8$
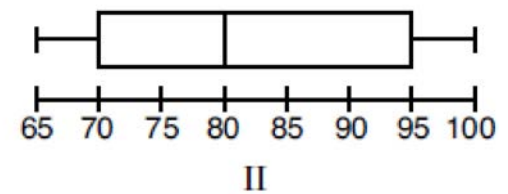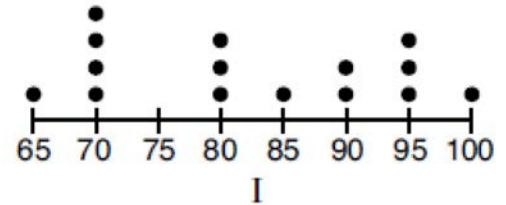
4) 

85 Given the following data set:

$$65, 70, 70, 70, 70, 80, 80, 80, 85, 90, 90, 95, 95, 95, 100$$

Which representations are correct for this data set?



I



II



III

1) I and II
2) I and III, only
3) II and III, only
4) I, II, and III

86 When factored completely, $x^3 - 13x^2 - 30x$ is

1) $x(x + 3)(x - 10)$
2) $x(x - 3)(x - 10)$
3) $x(x + 2)(x - 15)$
4) $x(x - 2)(x + 15)$

87 A radio station did a survey to determine what kind of music to play by taking a sample of middle school, high school, and college students. They were asked which of three different types of music they prefer on the radio: hip-hop, alternative, or classic rock. The results are summarized in the table below.

|  | Hip-Hop | Alternative | Classic Rock |
|---|---|---|---|
| Middle School | 28 | 18 | 4 |
| High School | 22 | 22 | 6 |
| College | 16 | 20 | 14 |

What percentage of college students prefer classic rock?
1) 14%
2) 28%
3) 33%
4) 58%

88 The dot plot shown below represents the number of pets owned by students in a class.
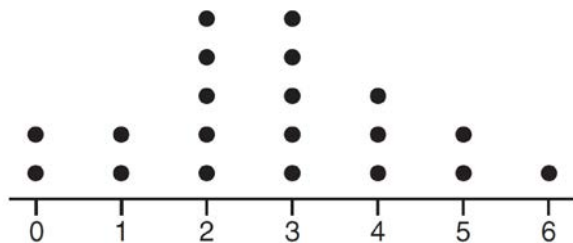


Which statement about the data is *not* true?
1) The median is 3.
2) The interquartile range is 2.
3) The mean is 3.
4) The data contain no outliers.

89 Which situation could be modeled by a linear function?
1) The value of a car depreciates by 7% annually.
2) A gym charges a $50 initial fee and then $30 monthly.
3) The number of bacteria in a lab doubles weekly.
4) The amount of money in a bank account increases by 0.1 % monthly.

90 Jordan works for a landscape company during his summer vacation. He is paid $12 per hour for mowing lawns and $14 per hour for planting gardens. He can work a maximum of 40 hours per week, and would like to earn at least $250 this week. If $m$ represents the number of hours mowing lawns and $g$ represents the number of hours planting gardens, which system of inequalities could be used to represent the given conditions?

1) $m + g \leq 40$

$12m + 14g \geq 250$

2) $m + g \geq 40$

$12m + 14g \leq 250$

3) $m + g \leq 40$

$12m + 14g \leq 250$

4) $m + g \geq 40$

$12m + 14g \geq 250$

91 Which value of $x$ satisfies the equation

$$\frac{5}{6}\left(\frac{3}{8} - x\right) = 16?$$

1) $-19.575$
2) $-18.825$
3) $-16.3125$
4) $-15.6875$

92 Analysis of data from a statistical study shows a linear relationship in the data with a correlation coefficient of -0.524. Which statement best summarizes this result?
1) There is a strong positive correlation between the variables.
2) There is a strong negative correlation between the variables.
3) There is a moderate positive correlation between the variables.
4) There is a moderate negative correlation between the variables.

93 Which system of equations does *not* have the same solution as the system below?
$$4x + 3y = 10$$
$$-6x - 5y = -16$$
1)
$$-12x - 9y = -30$$
$$12x + 10y = 32$$
2)
$$20x + 15y = 50$$
$$-18x - 15y = -48$$
3)
$$24x + 18y = 60$$
$$-24x - 20y = -64$$
4)
$$40x + 30y = 100$$
$$36x + 30y = -96$$

94 If $x = 2$, $y = 3\sqrt{2}$, and $w = 2\sqrt{8}$, which expression results in a rational number?
1) $x + y$
2) $y - w$
3) $(w)(y)$
4) $y \div x$

95 Abigail's and Gina's ages are consecutive integers. Abigail is younger than Gina and Gina's age is represented by $x$. If the difference of the square of Gina's age and eight times Abigail's age is 17, which equation could be used to find Gina's age?
1) $(x + 1)^2 - 8x = 17$
2) $(x - 1)^2 - 8x = 17$
3) $x^2 - 8(x + 1) = 17$
4) $x^2 - 8(x - 1) = 17$

96 What would be the order of these quadratic functions when they are arranged from the narrowest graph to the widest graph?
$$f(x) = -5x^2 \quad g(x) = 0.5x^2 \quad h(x) = 3x^2$$
1) $f(x), g(x), h(x)$
2) $g(x), h(x), f(x)$
3) $h(x), f(x), g(x)$
4) $f(x), h(x), g(x)$

97 Which domain is most appropriate for a function that represents the number of items, $f(x)$, placed into a laundry basket each day, $x$, for the month of January?
1) integers
2) whole numbers
3) rational numbers
4) irrational numbers

98 A part of Jennifer's work to solve the equation $2(6x^2 - 3) = 11x^2 - x$ is shown below.
Given: $2(6x^2 - 3) = 11x^2 - x$
Step 1: $12x^2 - 6 = 11x^2 - x$
Which property justifies her first step?
1) identity property of multiplication
2) multiplication property of equality
3) commutative property of multiplication
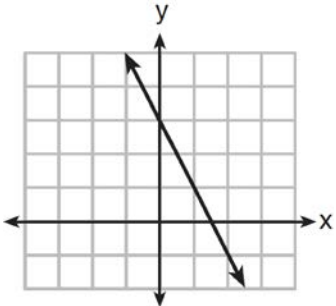4) distributive property of multiplication over subtraction

99  A parking garage charges a base rate of $3.50 for up to 2 hours, and an hourly rate for each additional hour. The sign below gives the prices for up to 5 hours of parking.

| Parking Rates | |
| --- | --- |
| 2 hours | $3.50 |
| 3 hours | $9.00 |
| 4 hours | $14.50 |
| 5 hours | $20.00 |

Which linear equation can be used to find $x$, the additional hourly parking rate?
1) $9.00 + 3x = 20.00$
2) $9.00 + 3.50x = 20.00$
3) $2x + 3.50 = 14.50$
4) $2x + 9.00 = 14.50$

100  A laboratory technician used the function $t(m) = 2(3)^{2m+1}$ to model her research. Consider the following expressions:
    I. $6(3)^{2m}$   II. $6(6)^{2m}$   III. $6(9)^m$
The function $t(m)$ is equivalent to
1) I, only
2) II, only
3) I and III
4) II and III

101  Which ordered pair does *not* fall on the line formed by the other three?
1) $(16, 18)$
2) $(12, 12)$
3) $(9, 10)$
4) $(3, 6)$

102  If $f(x) = \dfrac{3x+4}{2}$, then $f(8)$ is
1) 21
2) 16
3) 14
4) 4

103  The expression $36x^2 - 9$ is equivalent to
1) $(6x - 3)^2$
2) $(18x - 4.5)^2$
3) $(6x + 3)(6x - 3)$
4) $(18x + 4.5)(18x - 4.5)$

104  Which function has a constant rate of change equal to $-3$?

| x | y |
| --- | --- |
| 0 | 2 |
| 1 | 5 |
| 2 | 8 |
| 3 | 11 |

1)
2) $\{(1,5),(2,2),(3,-5),(4,4)\}$



3)
4) $2y = -6x + 10$

19

105  The graphs below represent four polynomial functions.  Which of these functions has zeros of 2 and −3?



1)



2)



3)



4)
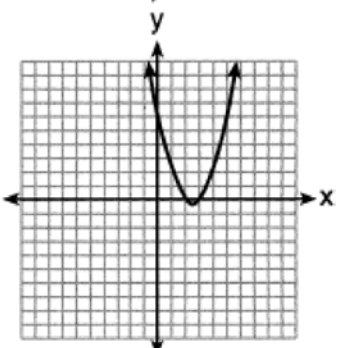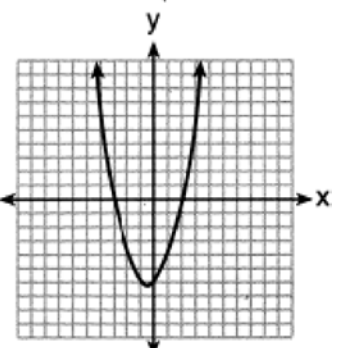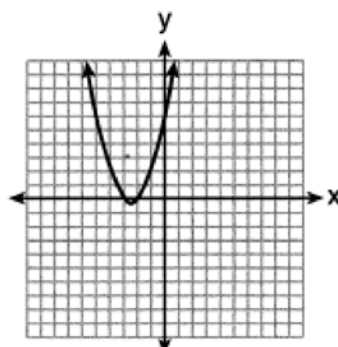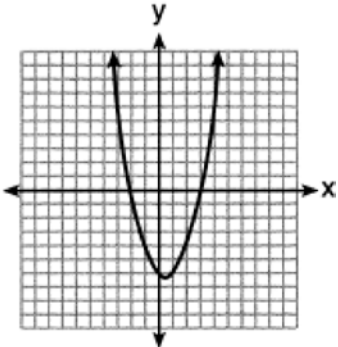
106  One characteristic of all linear functions is that they change by
1)  equal factors over equal intervals
2)  unequal factors over equal intervals
3)  equal differences over equal intervals
4)  unequal differences over equal intervals

107  The solution to $3(x − 8) + 4x = 8x + 4$ is
1)  12
2)  28
3)  −12
4)  −28

108  The expression $x^4 − 16$ is equivalent to
1)  $(x^2 + 8)(x^2 − 8)$
2)  $(x^2 − 8)(x^2 − 8)$
3)  $(x^2 + 4)(x^2 − 4)$
4)  $(x^2 − 4)(x^2 − 4)$

109  When the function $f(x) = x^2$ is multiplied by the value $a$, where $a > 1$, the graph of the new function, $g(x) = ax^2$
1)  opens upward and is wider
2)  opens upward and is narrower
3)  opens downward and is wider
4)  opens downward and is narrower

110  A store sells self-serve frozen yogurt sundaes.  The function $C(w)$ represents the cost, in dollars, of a sundae weighing $w$ ounces.  An appropriate domain for the function would be
1)  integers
2)  rational numbers
3)  nonnegative integers
4)  nonnegative rational numbers

111 The table below shows 6 students' overall averages and their averages in their math class.

| Overall Student Average | 92 | 98 | 84 | 80 | 75 | 82 |
|---|---|---|---|---|---|---|
| Math Class Average | 91 | 95 | 85 | 85 | 75 | 78 |

If a linear model is applied to these data, which statement best describes the correlation coefficient?
1) It is close to −1.
2) It is close to 1.
3) It is close to 0.
4) It is close to 0.5.

112 A high school club is researching a tour package offered by the Island Kayak Company. The company charges \$35 per person and \$245 for the tour guide. Which function represents the total cost, $C(x)$, of this kayak tour package for $x$ club members?
1) $C(x) = 35x$
2) $C(x) = 35x + 245$
3) $C(x) = 35(x + 245)$
4) $C(x) = 35 + (x + 245)$

113 An example of a sixth-degree polynomial with a leading coefficient of seven and a constant term of four is
1) $6x^7 − x^5 + 2x + 4$
2) $4 + x + 7x^6 − 3x^2$
3) $7x^4 + 6 + x^2$
4) $5x + 4x^6 + 7$

114 If $f(x) = 2(3^x) + 1$, what is the value of $f(2)$?
1) 13
2) 19
3) 37
4) 54

115 The heights, in inches, of 12 students are listed below.
$$61,67,72,62,65,59,60,79,60,61,64,63$$
Which statement best describes the spread of these data?
1) The set of data is evenly spread.
2) The median of the data is 59.5.
3) The set of data is skewed because 59 is the only value below 60.
4) 79 is an outlier, which would affect the standard deviation of these data.

116 Which function has the greatest $y$-intercept?
1) $f(x) = 3x$
2) $2x + 3y = 12$
3) the line that has a slope of 2 and passes through $(1, -4)$



4)
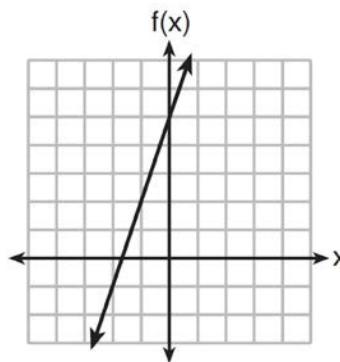
117 The table below shows the temperature, $T(m)$, of a cup of hot chocolate that is allowed to chill over several minutes, $m$.

| Time, m (minutes) | 0 | 2 | 4 | 6 | 8 |
|---|---|---|---|---|---|
| Temperature, T(m) (°F) | 150 | 108 | 78 | 56 | 41 |

Which expression best fits the data for $T(m)$?

1) $150(0.85)^m$

2) $150(1.15)^m$

3) $150(0.85)^{m-1}$

4) $150(1.15)^{m-1}$

118 The volume of a trapezoidal prism can be found using the formula $V = \frac{1}{2} a(b + c)h$. Which equation is correctly solved for $b$?

1) $b = \frac{V}{2ah} + c$

2) $b = \frac{V}{2ah} - c$

3) $b = \frac{2V}{ah} + c$

4) $b = \frac{2V}{ah} - c$

119 The range of the function $f(x) = |x + 3| - 5$ is

1) $[-5, \infty)$

2) $(-5, \infty)$

3) $[3, \infty)$

4) $(3, \infty)$

120 Faith wants to use the formula $C(f) = \frac{5}{9}(f - 32)$ to convert degrees Fahrenheit, $f$, to degrees Celsius, $C(f)$. If Faith calculated $C(68)$, what would her result be?

1) 20° Celsius

2) 20° Fahrenheit

3) 154° Celsius

4) 154° Fahrenheit

121 A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by $c(t) = 125t + 95$. Which statements about this function are true?

I. A house call fee costs $95.

II. The plumber charges $125 per hour.

III. The number of hours the job takes is represented by $t$.

1) I and II, only

2) I and III, only

3) II and III, only

4) I, II, and III

122 If a sequence is defined recursively as $a_1 = -3$ and $a_n = -3a_{n-1} - 2$, then $a_4$ is

1) −107

2) −95

3) 55

4) 67

123 The zeros of the function $f(x) = x^3 - 9x^2$ are

1) 9, only

2) 0 and 9

3) 0 and 3, only

4) −3, 0, and 3

124 A student invests $500 for 3 years in a savings account that earns 4% interest per year. No further deposits or withdrawals are made during this time. Which statement does *not* yield the correct balance in the account at the end of 3 years?

1)  $500(1.04)^3$
2)  $500(1-.04)^3$
3)  $500(1+.04)(1+.04)(1+.04)$
4)  $500+500(.04)+520(.04)+540.8(.04)$

125 Wenona sketched the polynomial $P(x)$ as shown on the axes below.



P(x)
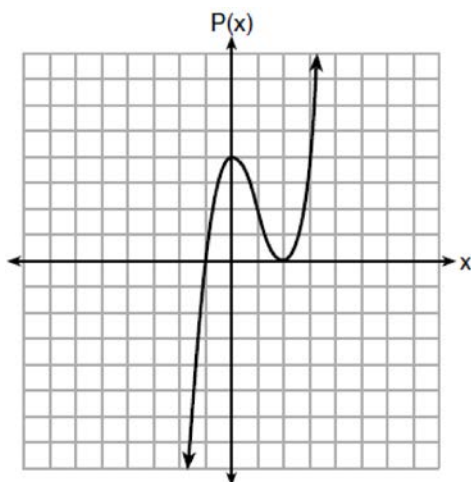
Which equation could represent $P(x)$?

1)  $P(x)=(x+1)(x-2)^2$
2)  $P(x)=(x-1)(x+2)^2$
3)  $P(x)=(x+1)(x-2)$
4)  $P(x)=(x-1)(x+2)$

126 Which expression is equivalent to $x^2+5x-6$?

1)  $(x+3)(x-2)$
2)  $(x+2)(x-3)$
3)  $(x-6)(x+1)$
4)  $(x+6)(x-1)$

127 Which sketch represents the polynomial function $f(x)=x(x+6)(x+3)$?



1)
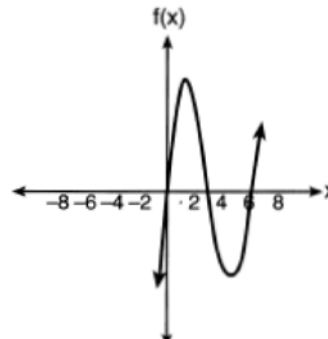


2)
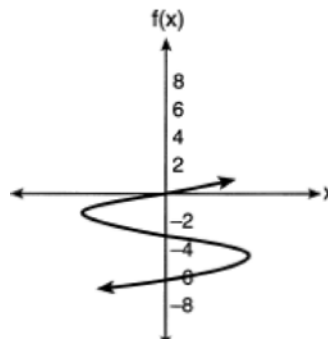


3)
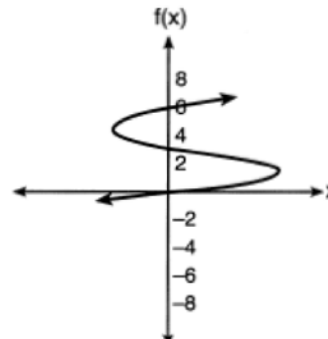


4)

128  Which relation is *not* a function?

1)

2)

3)

4)
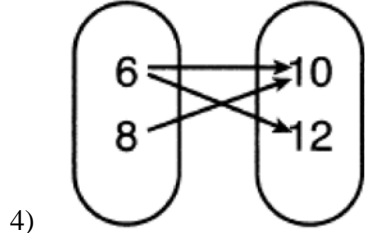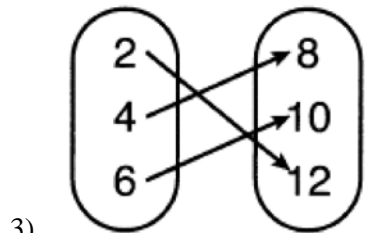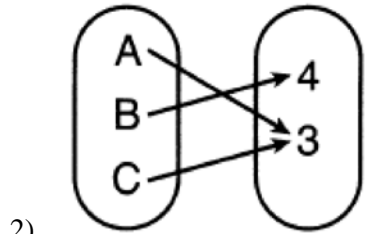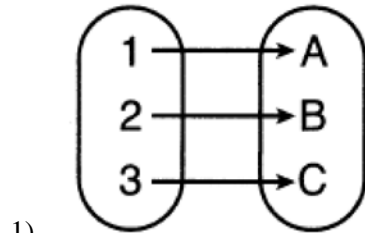
129  Mario's $15,000 car depreciates in value at a rate of 19% per year. The value, $V$, after $t$ years can be modeled by the function $V = 15,000(0.81)^t$. Which function is equivalent to the original function?

1)  $V = 15,000(0.9)^{9t}$

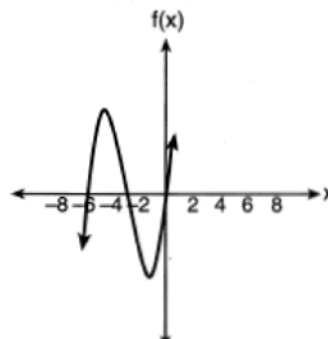2)  $V = 15,000(0.9)^{2t}$

3)  $V = 15,000(0.9)^{\frac{t}{9}}$

4)  $V = 15,000(0.9)^{\frac{t}{2}}$

130  The results of a linear regression are shown below.

$$y = ax + b$$

$$a = -1.15785$$

$$b = 139.3171772$$

$$r = -0.896557832$$

$$r^2 = 0.8038159461$$

Which phrase best describes the relationship between $x$ and $y$?
1)  strong negative correlation
2)  strong positive correlation
3)  weak negative correlation
4)  weak positive correlation

131  The shaded boxes in the figures below represent a sequence.

Figure 1          Figure 2          Figure 3
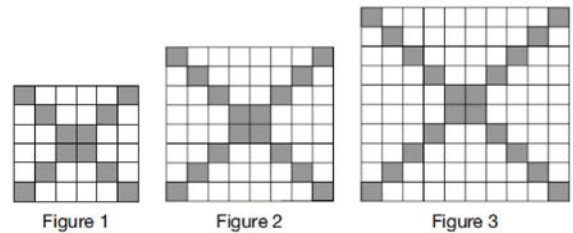
If figure 1 represents the first term and this pattern continues, how many shaded blocks will be in figure 35?
1)  55
2)  148
3)  420
4)  805

132  The solutions to $(x + 4)^2 - 2 = 7$ are
1)  $-4 \pm \sqrt{5}$
2)  $4 \pm \sqrt{5}$
3)  $-1$ and $-7$
4)  $1$ and $7$

24

133 The growth of a certain organism can be modeled by $C(t) = 10(1.029)^{24t}$, where $C(t)$ is the total number of cells after $t$ hours. Which function is approximately equivalent to $C(t)$?

1) $C(t) = 240(.083)^{24t}$
2) $C(t) = 10(.083)^{t}$
3) $C(t) = 10(1.986)^{t}$
4) $C(t) = 240(1.986)^{\frac{t}{24}}$

134 The first term in a sequence is 5 and the fifth term is 17. What is the common difference?

1) 2.4
2) 12
3) 3
4) 4

135 Patricia is trying to compare the average rainfall of New York to that of Arizona. A comparison between these two states for the months of July through September would be best measured in

1) feet per hour
2) inches per hour
3) inches per month
4) feet per month

136 Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1 V_1 = P_2 V_2$. When the formula is solved for $P_2$, the result is

1) $P_1 V_1 V_2$
2) $\dfrac{V_2}{P_1 V_1}$
3) $\dfrac{P_1 V_1}{V_2}$
4) $\dfrac{P_1 V_2}{V_1}$

137 What are the solutions to the equation $3x^2 + 10x = 8$?

1) $\dfrac{2}{3}$ and $-4$
2) $-\dfrac{2}{3}$ and $4$
3) $\dfrac{4}{3}$ and $-2$
4) $-\dfrac{4}{3}$ and $2$

138 Given: $f(x) = \dfrac{2}{3}x - 4$ and $g(x) = \dfrac{1}{4}x + 1$

Four statements about this system are written below.

    I. $f(4) = g(4)$
    II. When $x = 12$, $f(x) = g(x)$.
    III. The graphs of $f(x)$ and $g(x)$ intersect at $(12, 4)$.
    IV. The graphs of $f(x)$ and $g(x)$ intersect at $(4, 12)$.

Which statement(s) are true?

1) II, only
2) IV, only
3) I and IV
4) II and III

139 A construction company uses the function $f(p)$, where $p$ is the number of people working on a project, to model the amount of money it spends to complete a project. A reasonable domain for this function would be

1) positive integers
2) positive real numbers
3) both positive and negative integers
4) both positive and negative real numbers

140  The tables below show the values of four different functions for given values of *x*.

| x | f(x) |   | x | g(x) |   | x | h(x) |   | x | k(x) |
|---|------|---|---|------|---|---|------|---|---|------|
| 1 | 12   |   | 1 | −1   |   | 1 | 9    |   | 1 | −2   |
| 2 | 19   |   | 2 | 1    |   | 2 | 12   |   | 2 | 4    |
| 3 | 26   |   | 3 | 5    |   | 3 | 17   |   | 3 | 14   |
| 4 | 33   |   | 4 | 13   |   | 4 | 24   |   | 4 | 28   |

Which table represents a linear function?·
1)  $f(x)$
2)  $g(x)$
3)  $h(x)$
4)  $k(x)$

141  Which table could represent a function?

1)

| x | f(x) |
|---|------|
| 1 | 4    |
| 2 | 2    |
| 3 | 4    |
| 2 | 6    |

2)

| x | g(x) |
|---|------|
| 1 | 2    |
| 2 | 4    |
| 3 | 6    |
| 4 | 2    |

3)

| x | h(x) |
|---|------|
| 2 | 6    |
| 0 | 4    |
| 1 | 6    |
| 2 | 2    |

4)

| x | k(x) |
|---|------|
| 2 | 2    |
| 3 | 2    |
| 4 | 6    |
| 3 | 6    |

142  Eric deposits $500 in a bank account that pays 3.5% interest, compounded yearly.  Which type of function should he use to determine how much money he will have in the account at the end of 10 years?
1)  linear
2)  quadratic
3)  absolute value
4)  exponential

143  A construction worker needs to move 120 ft³ of dirt by using a wheelbarrow.  One wheelbarrow load holds 8 ft³ of dirt and each load takes him 10 minutes to complete.  One correct way to figure out the number of hours he would need to complete this job is

1)  $\dfrac{120 \text{ ft}^3}{1} \cdot \dfrac{10 \text{ min}}{1 \text{ load}} \cdot \dfrac{60 \text{ min}}{1 \text{ hr}} \cdot \dfrac{1 \text{ load}}{8 \text{ ft}^3}$

2)  $\dfrac{120 \text{ ft}^3}{1} \cdot \dfrac{60 \text{ min}}{1 \text{ hr}} \cdot \dfrac{8 \text{ ft}^3}{10 \text{ min}} \cdot \dfrac{1}{1 \text{ load}}$

3)  $\dfrac{120 \text{ ft}^3}{1} \cdot \dfrac{1 \text{ load}}{10 \text{ min}} \cdot \dfrac{8 \text{ ft}^3}{1 \text{ load}} \cdot \dfrac{1 \text{ hr}}{60 \text{ min}}$

4)  $\dfrac{120 \text{ ft}^3}{1} \cdot \dfrac{1 \text{ load}}{8 \text{ ft}^3} \cdot \dfrac{10 \text{ min}}{1 \text{ load}} \cdot \dfrac{1 \text{ hr}}{60 \text{ min}}$

144 Andy has $310 in his account. Each week, $w$, he withdraws $30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?
1) $310 - 8w$
2) $280 + 30(w - 1)$
3) $310w - 30$
4) $280 - 30(w - 1)$

145 Which expression is *not* equivalent to $-4x^3 + x^2 - 6x + 8$?
1) $x^2(-4x + 1) - 2(3x - 4)$
2) $x(-4x^2 - x + 6) + 8$
3) $-4x^3 + (x - 2)(x - 4)$
4) $-4(x^3 - 2) + x(x - 6)$

146 The expression $3(x^2 - 1) - (x^2 - 7x + 10)$ is equivalent to
1) $2x^2 - 7x + 7$
2) $2x^2 + 7x - 13$
3) $2x^2 - 7x + 9$
4) $2x^2 + 7x - 11$

147 The solution of an equation with two variables, $x$ and $y$, is
1) the set of all $x$ values that make $y = 0$
2) the set of all $y$ values that make $x = 0$
3) the set of all ordered pairs, $(x, y)$, that make the equation true
4) the set of all ordered pairs, $(x, y)$, where the graph of the equation crosses the $y$-axis

148 When $(2x - 3)^2$ is subtracted from $5x^2$, the result is
1) $x^2 - 12x - 9$
2) $x^2 - 12x + 9$
3) $x^2 + 12x - 9$
4) $x^2 + 12x + 9$

149 A student plotted the data from a sleep study as shown in the graph below.
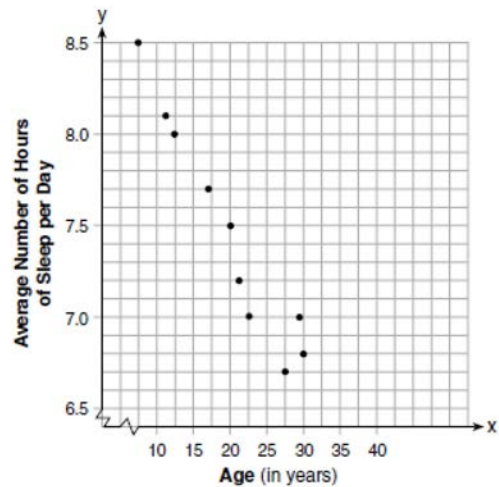


The student used the equation of the line $y = -0.09x + 9.24$ to model the data. What does the rate of change represent in terms of these data?
1) The average number of hours of sleep per day increases 0.09 hour per year of age.
2) The average number of hours of sleep per day decreases 0.09 hour per year of age.
3) The average number of hours of sleep per day increases 9.24 hours per year of age.
4) The average number of hours of sleep per day decreases 9.24 hours per year of age.

27

150  Which graph represents $y = \sqrt{x - 2}$ ?
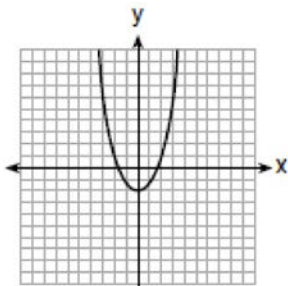
1)
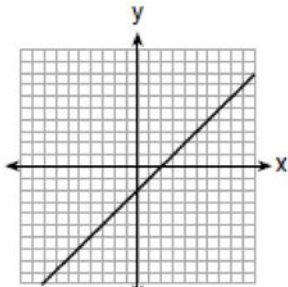
2)
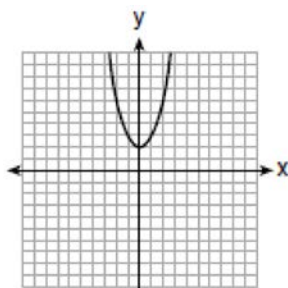
3)
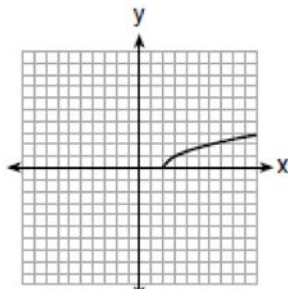
4)

151  In a sequence, the first term is 4 and the common difference is 3.  The fifth term of this sequence is
1)  −11
2)  −8
3)  16
4)  19

152  The equation $V(t) = 12,000(0.75)^t$ represents the value of a motorcycle $t$ years after it was purchased.  Which statement is true?
1)  The motorcycle cost $9000 when purchased.
2)  The motorcycle cost $12,000 when purchased.
3)  The motorcycle's value is decreasing at a rate of 75% each year.
4)  The motorcycle's value is decreasing at a rate of 0.25% each year.

153  If $f(n) = (n - 1)^2 + 3n$, which statement is true?
1)  $f(3) = -2$
2)  $f(-2) = 3$
3)  $f(-2) = -15$
4)  $f(-15) = -2$

154  A high school sponsored a badminton tournament.  After each round, one-half of the players were eliminated.  If there were 64 players at the start of the tournament, which equation models the number of players left after 3 rounds?
1)  $y = 64(1 - .5)^3$
2)  $y = 64(1 + .5)^3$
3)  $y = 64(1 - .3)^{0.5}$
4)  $y = 64(1 + .3)^{0.5}$

155  If the parent function of $f(x)$ is $p(x) = x^2$, then the graph of the function $f(x) = (x - k)^2 + 5$, where $k > 0$, would be a shift of
1)  $k$ units to the left and a move of 5 units up
2)  $k$ units to the left and a move of 5 units down
3)  $k$ units to the right and a move of 5 units up
4)  $k$ units to the right and a move of 5 units down

28

156 Given: the sequence $4, 7, 10, 13, \ldots$
When using the arithmetic sequence formula
$a_n = a_1 + (n-1)d$ to determine the 10th term,
which variable would be replaced with the number
3?
1) $a_1$
2) $n$
3) $a_n$
4) $d$

157 Sara was asked to solve this word problem: "The
product of two consecutive integers is 156. What
are the integers?" What type of equation should
she create to solve this problem?
1) linear
2) quadratic
3) exponential
4) absolute value

158 An online company lets you download songs for
$0.99 each after you have paid a $5 membership
fee. Which domain would be most appropriate to
calculate the cost to download songs?
1) rational numbers greater than zero
2) whole numbers greater than or equal to one
3) integers less than or equal to zero
4) whole numbers less than or equal to one

159 Joe has dimes and nickels in his piggy bank
totaling $1.45. The number of nickels he has is 5
more than twice the number of dimes, $d$. Which
equation could be used to find the number of dimes
he has?
1) $0.10d + 0.05(2d + 5) = 1.45$
2) $0.10(2d + 5) + 0.05d = 1.45$
3) $d + (2d + 5) = 1.45$
4) $(d - 5) + 2d = 1.45$

160 The 2014 winner of the Boston Marathon runs as
many as 120 miles per week. During the last few
weeks of his training for an event, his mileage can
be modeled by $M(w) = 120(.90)^{w-1}$, where $w$
represents the number of weeks since training
began. Which statement is true about the model
$M(w)$?
1) The number of miles he runs will increase by
90% each week.
2) The number of miles he runs will be 10% of
the previous week.
3) $M(w)$ represents the total mileage run in a
given week.
4) $w$ represents the number of weeks left until his
marathon.

161 Given the pattern below, which recursive formula
represents the number of triangles in this sequence?



1) $y = 2x + 3$
2) $y = 3x + 2$
3) $a_1 = 2$
$a_n = a_{n-1} + 3$
4) $a_1 = 3$
$a_n = a_{n-1} + 2$

162 If point $(K, -5)$ lies on the line whose equation is
$3x + y = 7$, then the value of $K$ is
1) $-8$
2) $-4$
3) $22$
4) $4$

29

163  Four quadratic functions are shown below.

| x | f(x) |
|---|------|
| −4 | −4 |
| −2 | 4 |
| −1 | 5 |
| 0 | 4 |
| 2 | −4 |
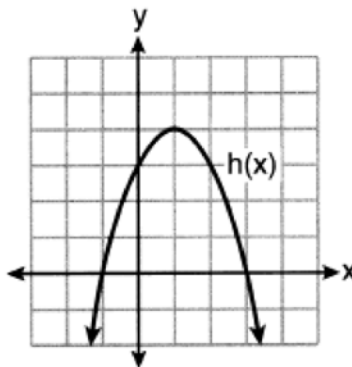


$$g(x) = -(x-4)^2 + 5 \qquad\qquad j(x) = -\frac{1}{2}x^2 + x + 4$$

Which statement is true?

1) The maximum of $f(x)$ is less than the maximum of $j(x)$.
2) The maximum of $g(x)$ is less than the maximum of $h(x)$.
3) The maximum of $f(x)$ equals the maximum of $g(x)$.
4) The maximum of $h(x)$ equals the maximum of $j(x)$.

164  When solving $x^2 - 10x - 13 = 0$ by completing the square, which equation is a step in the process?

1) $(x-5)^2 = 38$
2) $(x-5)^2 = 12$
3) $(x-10)^2 = 38$
4) $(x-10)^2 = 12$

165  It takes Tim 4.5 hours to run 50 kilometers. Which expression will allow him to change this rate to minutes per mile?

1) $\dfrac{4.5\,\text{hr}}{50\,\text{km}} \bullet \dfrac{1.609\,\text{km}}{1\,\text{mi}} \bullet \dfrac{60\,\text{min}}{1\,\text{hr}}$

2) $\dfrac{50\,\text{km}}{4.50\,\text{hr}} \bullet \dfrac{1\,\text{mi}}{1.609\,\text{km}} \bullet \dfrac{60\,\text{min}}{1\,\text{hr}}$

3) $\dfrac{50\,\text{km}}{4.50\,\text{hr}} \bullet \dfrac{1\,\text{mi}}{1.609\,\text{km}} \bullet \dfrac{1\,\text{hr}}{60\,\text{min}}$

4) $\dfrac{4.5\,\text{hr}}{50\,\text{km}} \bullet \dfrac{1\,\text{mi}}{1.609\,\text{km}} \bullet \dfrac{60\,\text{min}}{1\,\text{hr}}$

166  The zeros of the function $f(x) = 2x^3 + 12x - 10x^2$ are

1) $\{2,3\}$
2) $\{-1,6\}$
3) $\{0,2,3\}$
4) $\{0,-1,6\}$

167  Emily was given $600 for her high school graduation. She invested it in an account that earns 2.4% interest per year. If she does *not* make any deposits or withdrawals, which expression can be used to determine the amount of money that will be in the account after 4 years?

1) $600(1 + 0.24)^4$
2) $600(1 - 0.24)^4$
3) $600(1 + 0.024)^4$
4) $600(1 - 0.024)^4$

30

168 The graph of $y = f(x)$ is shown below.
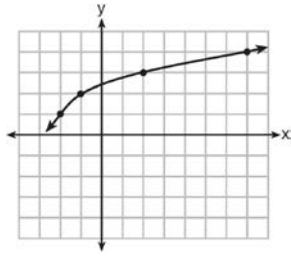


What is the graph of $y = f(x+1) - 2$?

1)


2)


3)


4)
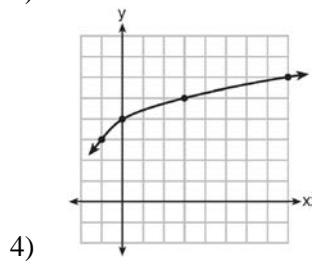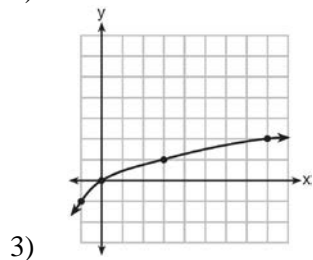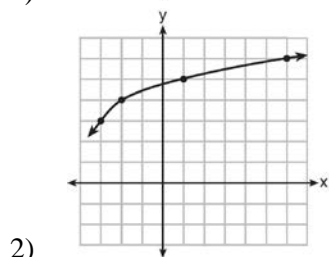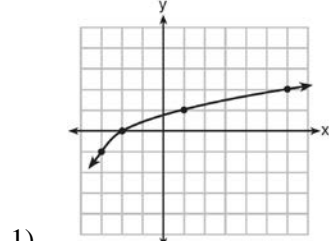

169 Which chart could represent the function $f(x) = -2x + 6$?

1)
| x | f(x) |
|---|------|
| 0 | 6 |
| 2 | 10 |
| 4 | 14 |
| 6 | 18 |

2)
| x | f(x) |
|---|------|
| 0 | 4 |
| 2 | 6 |
| 4 | 8 |
| 6 | 10 |

3)
| x | f(x) |
|---|------|
| 0 | 8 |
| 2 | 10 |
| 4 | 12 |
| 6 | 14 |

4)
| x | f(x) |
|---|------|
| 0 | 6 |
| 2 | 2 |
| 4 | -2 |
| 6 | -6 |

170 Which function defines the sequence $-6, -10, -14, -18, \ldots$, where $f(6) = -26$?
1) $f(x) = -4x - 2$
2) $f(x) = 4x - 2$
3) $f(x) = -x + 32$
4) $f(x) = x - 26$

171 In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when $x$ is
1) –2
2) 2
3) –4
4) 4

172 For a recently released movie, the function $y = 119.67(0.61)^x$ models the revenue earned, $y$, in millions of dollars each week, $x$, for several weeks after its release. Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?
1) 37.27
2) 27.16
3) 17.06
4) 10.11

173 What type of relationship exists between the number of pages printed on a printer and the amount of ink used by that printer?
1) positive correlation, but not causal
2) positive correlation, and causal
3) negative correlation, but not causal
4) negative correlation, and causal

174 The value of Tony's investment was $1140 on January 1st. On this date three years later, his investment was worth $1824. The average rate of change for this investment was $19 per
1) day
2) month
3) quarter
4) year

175 The graph below was created by an employee at a gas station.



Gas Sales
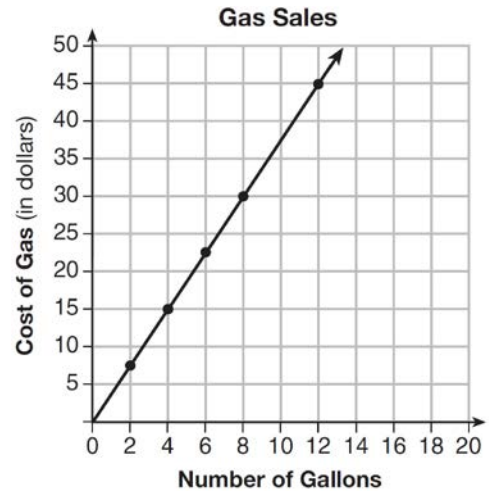
Which statement can be justified by using the graph?
1) If 10 gallons of gas was purchased, $35 was paid.
2) For every gallon of gas purchased, $3.75 was paid.
3) For every 2 gallons of gas purchased, $5.00 was paid.
4) If zero gallons of gas were purchased, zero miles were driven.

176 If a population of 100 cells triples every hour, which function represents $p(t)$, the population after $t$ hours?
1) $p(t) = 3(100)^t$
2) $p(t) = 100(3)^t$
3) $p(t) = 3t + 100$
4) $p(t) = 100t + 3$

177 In the process of solving the equation
$10x^2 - 12x - 16x = 6$, George wrote
$2(5x^2 - 14x) = 2(3)$, followed by $5x^2 - 14x = 3$.
Which properties justify George's process?

        A. addition property of equality
        B. division property of equality
        C. commutative property of addition
        D. distributive property

1) $A$ and $C$
2) $A$ and $B$
3) $D$ and $C$
4) $D$ and $B$

178 Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30,000(0.78)^x$, where $x$ is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

1) It decreases 78% per year.
2) It decreases 22% per year.
3) It increases 78% per year.
4) It increases 22% per year.

179 A swimmer set a world record in the women's 1500-meter freestyle, finishing the race in 15.42 minutes. If 1 meter is approximately 3.281 feet, which set of calculations could be used to convert her speed to miles per hour?

1) $\dfrac{1500\text{ meters}}{15.42\text{ min}} \cdot \dfrac{60\text{ min}}{1\text{ hour}} \cdot \dfrac{1\text{ meter}}{3.281\text{ feet}} \cdot \dfrac{1\text{ mile}}{5280\text{ feet}}$

2) $\dfrac{1500\text{ meters}}{15.42\text{ min}} \cdot \dfrac{60\text{ min}}{1\text{ hour}} \cdot \dfrac{3.281\text{ feet}}{1\text{ meter}} \cdot \dfrac{1\text{ mile}}{5280\text{ feet}}$

3) $\dfrac{1500\text{ meters}}{15.42\text{ min}} \cdot \dfrac{3.281\text{ feet}}{1\text{ meter}} \cdot \dfrac{1\text{ mile}}{5280\text{ feet}}$

4) $\dfrac{1500\text{ meters}}{15.42\text{ min}} \cdot \dfrac{60\text{ min}}{1\text{ hour}} \cdot \dfrac{1\text{ mile}}{5280\text{ feet}}$

180 The expression $3(x+4) - (2x+7)$ is equivalent to
1) $x+5$
2) $x-10$
3) $x-3$
4) $x+11$

181 The Celluloid Cinema sold 150 tickets to a movie. Some of these were child tickets and the rest were adult tickets. A child ticket cost $7.75 and an adult ticket cost $10.25. If the cinema sold $1470 worth of tickets, which system of equations could be used to determine how many adult tickets, $a$, and how many child tickets, $c$, were sold?

1) $a + c = 150$

   $10.25a + 7.75c = 1470$

2) $a + c = 1470$

   $10.25a + 7.75c = 150$

3) $a + c = 150$

   $7.75a + 10.25c = 1470$

4) $a + c = 1470$

   $7.75a + 10.25c = 150$

182 A mapping is shown in the diagram below.
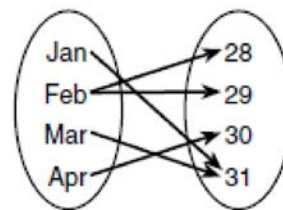


This mapping is
1) a function, because Feb has two outputs, 28 and 29
2) a function, because two inputs, Jan and Mar, result in the output 31
3) not a function, because Feb has two outputs, 28 and 29
4) not a function, because two inputs, Jan and Mar, result in the output 31

183  The table below shows the time, in hours, spent by students on electronic devices and their math test scores. The data collected model a linear regression.

| Time Spent on an Electronic Device (hours) | Math Test Score |
|---|---|
| 3 | 85 |
| 1 | 99 |
| 4 | 81 |
| 0 | 98 |
| 3 | 90 |
| 7 | 65 |
| 5 | 78 |
| 2 | 90 |

What is the correlation coefficient, to the *nearest hundredth*, for these data?
1)  −0.98
2)  −0.95
3)  0.98
4)  0.95

184  The zeros of the function $f(x) = 2x^2 - 4x - 6$ are
1)  3 and −1
2)  3 and 1
3)  −3 and 1
4)  −3 and −1
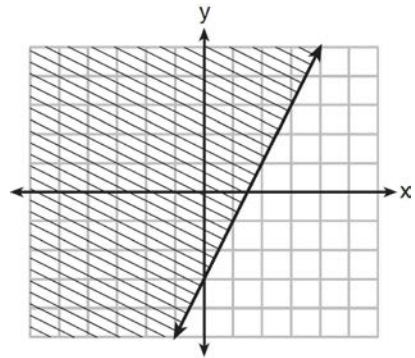
185  A population of paramecia, $P$, can be modeled using the exponential function $P(t) = 3(2)^t$, where $t$ is the number of days since the population was first observed. Which domain is most appropriate to use to determine the population over the course of the first two weeks?
1)  $t \geq 0$
2)  $t \leq 2$
3)  $0 \leq t \leq 2$
4)  $0 \leq t \leq 14$

186  Which inequality is represented by the graph below?



1)  $y \leq 2x - 3$
2)  $y \geq 2x - 3$
3)  $y \leq -3x + 2$
4)  $y \geq -3x + 2$

187 A middle school conducted a survey of students to determine if they spent more of their time playing games or watching videos on their tablets. The results are shown in the table below.

|  | Playing Games | Watching Videos | Total |
|---|---|---|---|
| Boys | 138 | 46 | 184 |
| Girls | 54 | 142 | 196 |
| Total | 192 | 188 | 380 |

Of the students who spent more time playing games on their tablets, approximately what percent were boys?
1) 41
2) 56
3) 72
4) 75

188 Which equation is equivalent to $y - 34 = x(x - 12)$?
1) $y = (x - 17)(x + 2)$
2) $y = (x - 17)(x - 2)$
3) $y = (x - 6)^2 + 2$
4) $y = (x - 6)^2 - 2$

189 The method of completing the square was used to solve the equation $2x^2 - 12x + 6 = 0$. Which equation is a correct step when using this method?
1) $(x - 3)^2 = 6$
2) $(x - 3)^2 = -6$
3) $(x - 3)^2 = 3$
4) $(x - 3)^2 = -3$
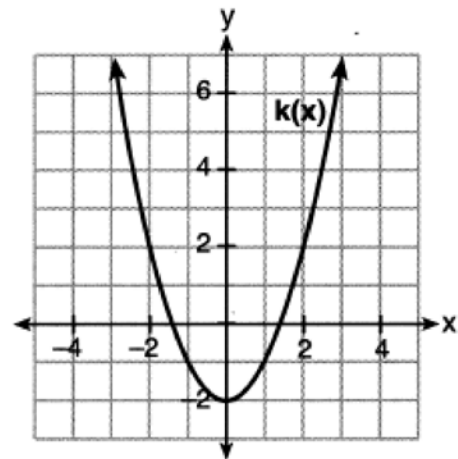
190 Which situation does *not* describe a causal relationship?
1) The higher the volume on a radio, the louder the sound will be.
2) The faster a student types a research paper, the more pages the paper will have.
3) The shorter the distance driven, the less gasoline that will be used.
4) The slower the pace of a runner, the longer it will take the runner to finish the race.

191 Which function has the *smallest* y-intercept value?

| x | g(x) |
|---|---|
| -2 | 3 |
| 0 | 1 |
| 1 | 0 |
| 3 | -2 |

1)

2) $h(x) = \sqrt{x} - 3$

3)



4) $f(x) = x^2 + 2x - 1$

35

192  After performing analyses on a set of data, Jackie examined the scatter plot of the residual values for each analysis. Which scatter plot indicates the best linear fit for the data?

1)

2)

3)

4)
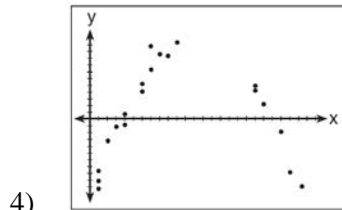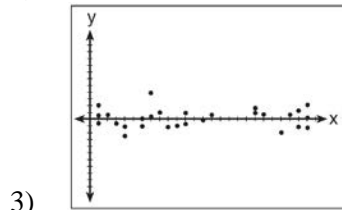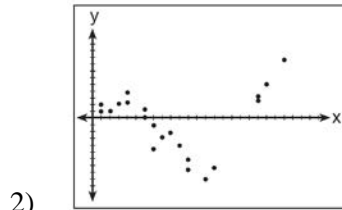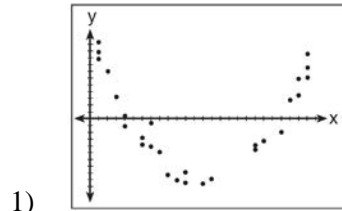
193  An equation is given below.
$$4(x - 7) = 0.3(x + 2) + 2.11$$
The solution to the equation is
1)  8.3
2)  8.7
3)  3
4)  -3

194  A computer application generates a sequence of musical notes using the function $f(n) = 6(16)^n$, where $n$ is the number of the note in the sequence and $f(n)$ is the note frequency in hertz. Which function will generate the same note sequence as $f(n)$?
1)  $g(n) = 12(2)^{4n}$
2)  $h(n) = 6(2)^{4n}$
3)  $p(n) = 12(4)^{2n}$
4)  $k(n) = 6(8)^{2n}$

195  The functions $f(x) = x^2 - 6x + 9$ and $g(x) = f(x) + k$ are graphed below.
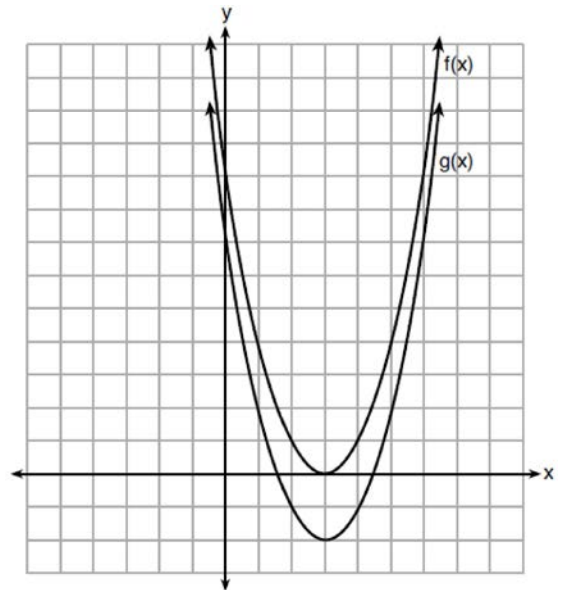
Which value of $k$ would result in the graph of $g(x)$?
1)  0
2)  2
3)  −3
4)  −2

196 Which product is equivalent to $4x^2 - 3x - 27$?
1) $(2x+9)(2x-3)$
2) $(2x-9)(2x+3)$
3) $(4x+9)(x-3)$
4) $(4x-9)(x+3)$

197 Lynn, Jude, and Anne were given the function
$f(x) = -2x^2 + 32$, and they were asked to find $f(3)$.
Lynn's answer was 14, Jude's answer was 4, and
Anne's answer was ±4. Who is correct?
1) Lynn, only
2) Jude, only
3) Anne, only
4) Both Lynn and Jude

198 Which statement best describes the solutions of a
two-variable equation?
1) The ordered pairs must lie on the graphed
   equation.
2) The ordered pairs must lie near the graphed
   equation.
3) The ordered pairs must have $x = 0$ for one
   coordinate.
4) The ordered pairs must have $y = 0$ for one
   coordinate.

199 Joe has a rectangular patio that measures 10 feet by
12 feet. He wants to increase the area by 50% and
plans to increase each dimension by equal lengths,
$x$. Which equation could be used to determine $x$?
1) $(10+x)(12+x) = 120$
2) $(10+x)(12+x) = 180$
3) $(15+x)(18+x) = 180$
4) $(15)(18) = 120 + x^2$

200 When the equation $\frac{x-1}{2} - \frac{a}{4} = \frac{3a}{4}$ is solved for $x$
in terms of $a$, the solution is
1) $\frac{3a}{2} + 1$
2) $a + 1$
3) $\frac{4a+1}{2}$
4) $2a + 1$

201 What is the constant term of the polynomial
$4d + 6 + 3d^2$?
1) 6
2) 2
3) 3
4) 4

202 The equation $A = 1300(1.02)^7$ is being used to
calculate the amount of money in a savings
account. What does 1.02 represent in this
equation?
1) 0.02% decay
2) 0.02% growth
3) 2% decay
4) 2% growth

203 Which value of $x$ results in equal outputs for
$j(x) = 3x - 2$ and $b(x) = |x + 2|$?
1) −2
2) 2
3) $\frac{2}{3}$
4) 4

37

204 Dan took 12.5 seconds to run the 100-meter dash. He calculated the time to be approximately
1) 0.2083 minute
2) 750 minutes
3) 0.2083 hour
4) 0.52083 hour

205 Below are two representations of data.

A: 2,5,5,6,6,6,7,8,9

B:
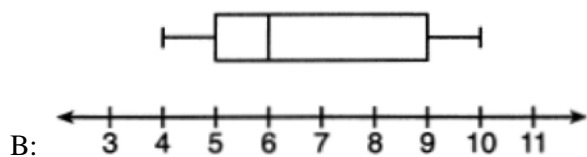


Which statement about A and B is true?
1) median of A > median of B
2) range of A < range of B
3) upper quartile of A < upper quartile of B
4) lower quartile of A > lower quartile of B

206 Given the functions $h(x) = \frac{1}{2}x + 3$ and $j(x) = |x|$, which value of x makes $h(x) = j(x)$?
1) −2
2) 2
3) 3
4) −6

207 Which domain would be the most appropriate to use for a function that compares the number of emails sent (x) to the amount of data used for a cell phone plan (y)?
1) integers
2) whole numbers
3) rational numbers
4) irrational numbers

208 How many of the equations listed below represent the line passing through the points $(2,3)$ and $(4,-7)$?

$$5x + y = 13$$
$$y + 7 = -5(x - 4)$$
$$y = -5x + 13$$
$$y - 7 = 5(x - 4)$$

1) 1
2) 2
3) 3
4) 4

209 An expression of the fifth degree is written with a leading coefficient of seven and a constant of six. Which expression is correctly written for these conditions?
1) $6x^5 + x^4 + 7$
2) $7x^6 - 6x^4 + 5$
3) $6x^7 - x^5 + 5$
4) $7x^5 + 2x^2 + 6$

210 A system of equations is given below.
$$x + 2y = 5$$
$$2x + y = 4$$
Which system of equations does *not* have the same solution?
1) $3x + 6y = 15$
   $2x + y = 4$
2) $4x + 8y = 20$
   $2x + y = 4$
3) $x + 2y = 5$
   $6x + 3y = 12$
4) $x + 2y = 5$
   $4x + 2y = 12$

211 To keep track of his profits, the owner of a carnival booth decided to model his ticket sales on a graph. He found that his profits only declined when he sold between 10 and 40 tickets. Which graph could represent his profits?
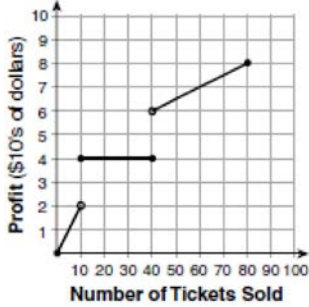
1)
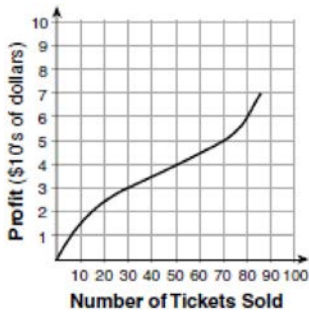
2)
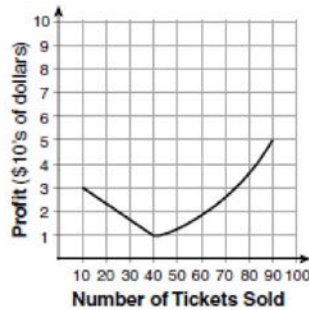
3)
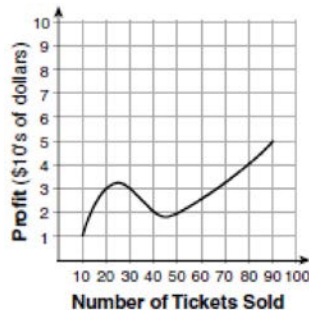
4)

212 The expression $x^2 - 10x + 24$ is equivalent to
1) $(x + 12)(x - 2)$
2) $(x - 12)(x + 2)$
3) $(x + 6)(x + 4)$
4) $(x - 6)(x - 4)$

213 Given $7x + 2 \geq 58$, which number is *not* in the solution set?
1) 6
2) 8
3) 10
4) 12

214 The graph representing a function is shown below.
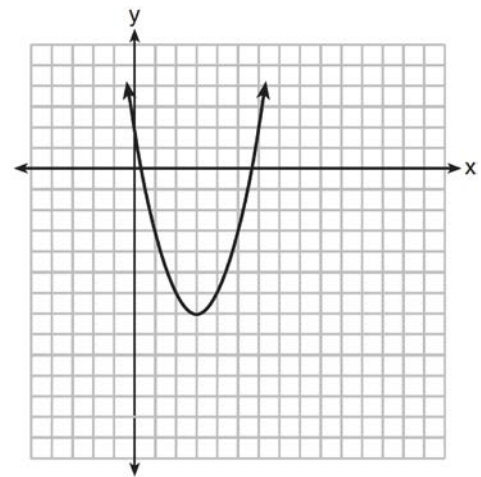
Which function has a minimum that is *less* than the one shown in the graph?
1) $y = x^2 - 6x + 7$
2) $y = |x + 3| - 6$
3) $y = x^2 - 2x - 10$
4) $y = |x - 8| + 2$

39

215  Donna and Andrew compared their math final exam scores from grade 8 through grade 12. Their scores are shown below.

| Donna | |
|---|---|
| 8th | 90 |
| 9th | 92 |
| 10th | 87 |
| 11th | 94 |
| 12th | 95 |

| Andrew | |
|---|---|
| 8th | 78 |
| 9th | 96 |
| 10th | 87 |
| 11th | 94 |
| 12th | 93 |

Which statement about their final exam scores is correct?
1) Andrew has a higher mean than Donna.
2) Donna and Andrew have the same median.
3) Andrew has a larger interquartile range than Donna.
4) The 3rd quartile for Donna is greater than the 3rd quartile for Andrew.

216  The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where $x$ is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?
1) integers
2) positive real numbers
3) positive rational numbers
4) whole numbers

217  If $x \neq 0$, then the common ratio of the sequence $x, 2x^2, 4x^3, 8x^4, 16x^5, \ldots$ is
1) $2x$
2) $2$
3) $x$
4) $\frac{1}{2}x$

218  The expression $(m-3)^2$ is equivalent to
1) $m^2 + 9$
2) $m^2 - 9$
3) $m^2 - 6m + 9$
4) $m^2 - 6m - 9$

219  Kendal bought $x$ boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes, $x$, Kendal bought?
1) $2x - 12 = 60$
2) $12x - 2 = 60$
3) $12x - 24 = 60$
4) $24 - 12x = 60$

220 Which table of values represents an exponential relationship?

1)

| x | f(x) |
|---|------|
| 1 | 6 |
| 2 | 9 |
| 3 | 12 |
| 4 | 15 |
| 5 | 18 |

2)

| x | h(x) |
|---|------|
| 1 | 2 |
| 2 | 7 |
| 3 | 12 |
| 4 | 17 |
| 5 | 22 |

3)

| x | k(x) |
|---|------|
| 1 | 4 |
| 2 | 16 |
| 3 | 64 |
| 4 | 256 |
| 5 | 1024 |

4)

| x | p(x) |
|---|-------|
| 1 | −9.5 |
| 2 | −12 |
| 3 | −14.5 |
| 4 | −17 |
| 5 | −19.5 |

221 When $3x^2 + 7x - 6 + 2x^3$ is written in standard form, the leading coefficient is
1) 7
2) 2
3) 3
4) −6

222 A sequence is defined recursively by
$$a_1 = -2$$
$$a_n = 3a_{n-1} + 1$$
What is the value of $a_4$?
1) −41
2) −14
3) 22
4) 67

223 What are the solutions to the equation $x^2 - 8x = 10$?
1) $4 \pm \sqrt{10}$
2) $4 \pm \sqrt{26}$
3) $-4 \pm \sqrt{10}$
4) $-4 \pm \sqrt{26}$

224 Which correlation shows a causal relationship?
1) The more minutes an athlete is on the playing field, the more goals he scores.
2) The more gasoline that you purchase at the pump, the more you pay.
3) The longer a shopper stays at the mall, the more purchases she makes.
4) As the price of a gift increases, the size of the gift box increases.

225 Which function is shown in the table below?

| x | f(x) |
|----|------|
| −2 | $\frac{1}{9}$ |
| −1 | $\frac{1}{3}$ |
| 0 | 1 |
| 1 | 3 |
| 2 | 9 |
| 3 | 27 |

1) $f(x) = 3x$

2) $f(x) = x + 3$

3) $f(x) = -x^3$

4) $f(x) = 3^x$

226 Given $f(x) = 3x - 5$, which statement is true?
1) $f(0) = 0$
2) $f(3) = 4$
3) $f(4) = 3$
4) $f(5) = 0$

227 The expression $49x^2 - 36$ is equivalent to
1) $(7x - 6)^2$
2) $(24.5x - 18)^2$
3) $(7x - 6)(7x + 6)$
4) $(24.5x - 18)(24.5x + 18)$

228 What is the *minimum* value of the function
$y = |x + 3| - 2$?
1) −2
2) 2
3) 3
4) −3

229 Students were asked to write an expression which had a leading coefficient of 3 and a constant term of −4. Which response is correct?
1) $3 - 2x^3 - 4x$
2) $7x^3 - 3x^5 - 4$
3) $4 - 7x + 3x^3$
4) $-4x^2 + 3x^4 - 4$

230 What is the solution to the system of equations below?
$$y = 2x + 8$$
$$3(-2x + y) = 12$$
1) no solution
2) infinite solutions
3) $(-1, 6)$
4) $\left(\frac{1}{2}, 9\right)$

231 Which value of $x$ makes $\dfrac{x-3}{4} + \dfrac{2}{3} = \dfrac{17}{12}$ true?

1) 8
2) 6
3) 0
4) 4

232 The range of the function $f(x) = x^2 + 2x - 8$ is all real numbers
1) less than or equal to $-9$
2) greater than or equal to $-9$
3) less than or equal to $-1$
4) greater than or equal to $-1$

233 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min. If $t$ represents the number of minutes on the treadmill and $b$ represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?
1) $b$
2) $5b$
3) $45 - b$
4) $250 - 5b$

234 Sarah travels on her bicycle at a speed of 22.7 miles per hour. What is Sarah's approximate speed, in kilometers per minute?
1) 0.2
2) 0.6
3) 36.5
4) 36.6

235 A function is defined as $K(x) = 2x^2 - 5x + 3$. The value of $K(-3)$ is
1) 54
2) 36
3) 0
4) $-18$

236 A car leaves Albany, NY, and travels west toward Buffalo, NY. The equation $D = 280 - 59t$ can be used to represent the distance, $D$, from Buffalo after $t$ hours. In this equation, the 59 represents the
1) car's distance from Albany
2) speed of the car
3) distance between Buffalo and Albany
4) number of hours driving

237 Different ways to represent data are shown below.
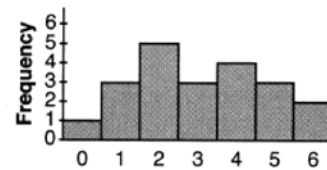


Which data representations have a median of 2?
1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

238  Jill invests $400 in a savings bond.  The value of the bond, $V(x)$, in hundreds of dollars after $x$ years is illustrated in the table below.

| x | V(x) |
|---|------|
| 0 | 4 |
| 1 | 5.4 |
| 2 | 7.29 |
| 3 | 9.84 |

Which equation and statement illustrate the approximate value of the bond in hundreds of dollars over time in years?

1)  $V(x) = 4(0.65)^x$ and it grows.

2)  $V(x) = 4(0.65)^x$ and it decays.

3)  $V(x) = 4(1.35)^x$ and it grows.

4)  $V(x) = 4(1.35)^x$ and it decays.

239  The height of a rocket, at selected times, is shown in the table below.

| Time (sec) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Height (ft) | 180 | 260 | 308 | 324 | 308 | 260 | 180 | 68 |

Based on these data, which statement is *not* a valid conclusion?

1)  The rocket was launched from a height of 180 feet.

2)  The maximum height of the rocket occurred 3 seconds after launch.

3)  The rocket was in the air approximately 6 seconds before hitting the ground.

4)  The rocket was above 300 feet for approximately 2 seconds.

240  Which expression is equivalent to $2(3g - 4) - (8g + 3)$?

1)  $-2g - 1$

2)  $-2g - 5$

3)  $-2g - 7$

4)  $-2g - 11$

241  Which value of $x$ is a solution to the equation $13 - 36x^2 = -12$?

1)  $\dfrac{36}{25}$

2)  $\dfrac{25}{36}$

3)  $-\dfrac{6}{5}$

4)  $-\dfrac{5}{6}$

## Algebra I Multiple Choice Regents Exam Questions

242 Marc bought a new laptop for $1250. He kept track of the value of the laptop over the next three years, as shown in the table below.

| Years After Purchase | Value in Dollars |
|---|---|
| 1 | 1000 |
| 2 | 800 |
| 3 | 640 |

Which function can be used to determine the value of the laptop for $x$ years after the purchase?
1) $f(x) = 1000(1.2)^x$
2) $f(x) = 1000(0.8)^x$
3) $f(x) = 1250(1.2)^x$
4) $f(x) = 1250(0.8)^x$

243 Which expression is equivalent to $y^4 - 100$?
1) $(y^2 - 10)^2$
2) $(y^2 - 50)^2$
3) $(y^2 + 10)(y^2 - 10)$
4) $(y^2 + 50)(y^2 - 50)$

244 Which expression is *not* equivalent to $2x^2 + 10x + 12$?
1) $(2x + 4)(x + 3)$
2) $(2x + 6)(x + 2)$
3) $(2x + 3)(x + 4)$
4) $2(x + 3)(x + 2)$

245 Which ordered pair below is *not* a solution to $f(x) = x^2 - 3x + 4$?
1) $(0,4)$
2) $(1.5, 1.75)$
3) $(5, 14)$
4) $(-1, 6)$

246 The expression $16x^2 - 81$ is equivalent to
1) $(8x - 9)(8x + 9)$
2) $(8x - 9)(8x - 9)$
3) $(4x - 9)(4x + 9)$
4) $(4x - 9)(4x - 9)$

247 If $f(x) = 4x + 5$, what is the value of $f(-3)$?
1) $-2$
2) $-7$
3) $17$
4) $4$

248 What is a common ratio of the geometric sequence whose first term is 5 and third term is 245?
1) $7$
2) $49$
3) $120$
4) $240$

249 The population of a small town over four years is recorded in the chart below, where 2013 is represented by $x = 0$. [Population is rounded to the nearest person]

| Year | 2013 | 2014 | 2015 | 2016 |
| --- | --- | --- | --- | --- |
| Population | 3810 | 3943 | 4081 | 4224 |

The population, $P(x)$, for these years can be modeled by the function $P(x) = ab^x$, where $b$ is rounded to the nearest thousandth. Which statements about this function are true?

      I.   $a = 3810$
      II.  $a = 4224$
      III. $b = 0.035$
      IV. $b = 1.035$

1) I and III
2) I and IV
3) II and III
4) II and IV

250 Which ordered pair would *not* be a solution to $y = x^3 - x$?
1) $(-4, -60)$
2) $(-3, -24)$
3) $(-2, -6)$
4) $(-1, -2)$

251 Which ordered pair does *not* represent a point on the graph of $y = 3x^2 - x + 7$?
1) $(-1.5, 15.25)$
2) $(0.5, 7.25)$
3) $(1.25, 10.25)$
4) $(2.5, 23.25)$

252 If $f(x) = x^2 + 2$, which interval describes the range of this function?
1) $(-\infty, \infty)$
2) $[0, \infty)$
3) $[2, \infty)$
4) $(-\infty, 2]$

253 The box plot below summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida.
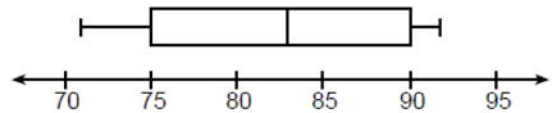


The third quartile is
1) 92
2) 90
3) 83
4) 71

254 The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:
  I. 10 miles
  II. 44,880 feet
  III. 15,560 yards
Which run(s) are at least 15 kilometers?
1) I, only
2) II, only
3) I and III
4) II and III

255 Which of the quadratic functions below has the *smallest* minimum value?

1) $h(x) = x^2 + 2x - 6$

2)

g(x)
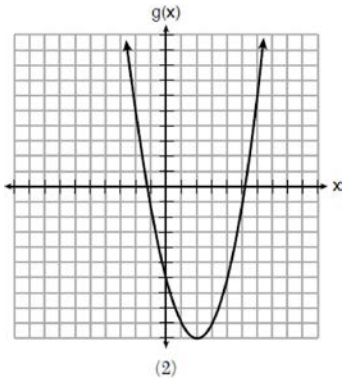
(2)

3) $k(x) = (x + 5)(x + 2)$

| x | f(x) |
|----|------|
| −1 | −2 |
| 0 | −5 |
| 1 | −6 |
| 2 | −5 |
| 3 | −2 |

4)

256 A system of equations is shown below.

Equation A: $5x + 9y = 12$

Equation B: $4x - 3y = 8$

Which method eliminates one of the variables?

1) Multiply equation A by $-\dfrac{1}{3}$ and add the result to equation B.

2) Multiply equation B by 3 and add the result to equation A.

3) Multiply equation A by 2 and equation B by −6 and add the results together.

4) Multiply equation B by 5 and equation A by 4 and add the results together.

257 The graph of $f(x)$ is shown below.

f(x)
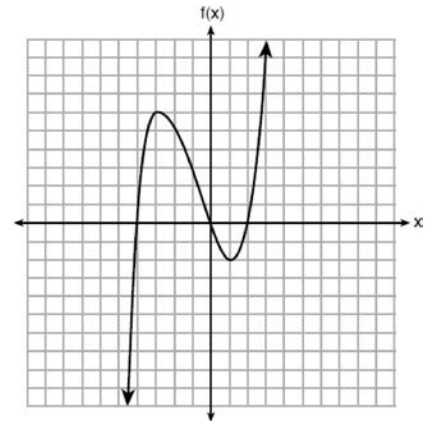
What is the value of $f(-3)$?

1) 6
2) 2
3) −2
4) −4

258 Which type of function is shown in the graph below?

Population Size (N)

Time (t)
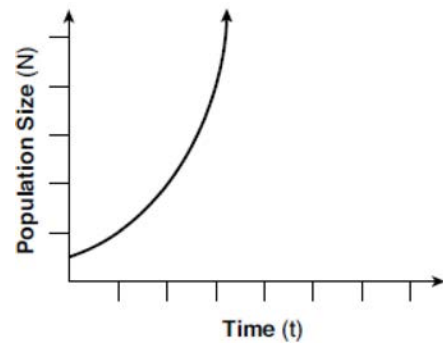
1) linear
2) exponential
3) square root
4) absolute value

259 Which table represents a function?

1)

| x | y |
|---|---|
| 2 | -3 |
| 3 | 0 |
| 4 | -3 |
| 2 | 1 |

2)

| x | y |
|---|---|
| 1 | 2 |
| 1 | 3 |
| 1 | 4 |
| 1 | 5 |

3)

| x | y |
|---|---|
| -3 | 0 |
| -2 | 1 |
| -3 | 2 |
| 2 | 3 |

4)

| x | y |
|---|---|
| -2 | -4 |
| 0 | 2 |
| 2 | 4 |
| 4 | 6 |

260 Students were asked to write $6x^5 + 8x - 3x^3 + 7x^7$ in standard form. Shown below are four student responses.

Anne: $7x^7 + 6x^5 - 3x^3 + 8x$

Bob: $-3x^3 + 6x^5 + 7x^7 + 8x$

Carrie: $8x + 7x^7 + 6x^5 - 3x^3$

Dylan: $8x - 3x^3 + 6x^5 + 7x^7$

Which student is correct?
1) Anne
2) Bob
3) Carrie
4) Dylan

261 A child is playing outside. The graph below shows the child's distance, $d(t)$, in yards from home over a period of time, $t$, in seconds.
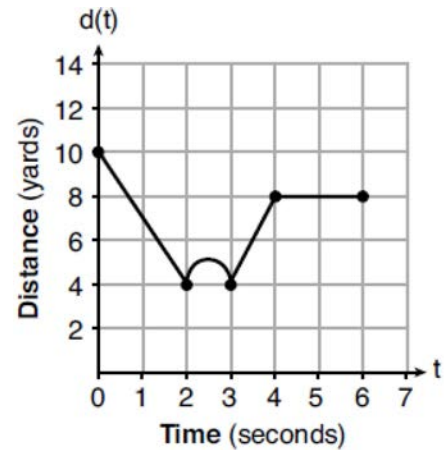


Which interval represents the child constantly moving closer to home?
1) $0 \le t \le 2$
2) $2 \le t \le 3$
3) $3 \le t \le 4$
4) $4 \le t \le 6$

262 Which system of equations will yield the same solution as the system below?

$$x - y = 3$$
$$2x - 3y = -1$$

1) $-2x - 2y = -6$
   $2x - 3y = -1$

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

3) $2x - 2y = 6$
   $2x - 3y = -1$

4) $3x + 3y = 9$
   $2x - 3y = -1$

263 Three functions are shown below.

A: $g(x) = -\dfrac{3}{2}x + 4$

B: $f(x) = (x+2)(x+6)$
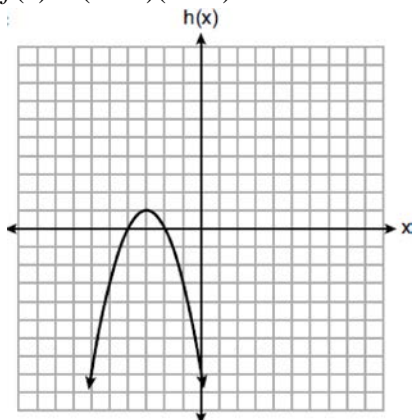


C:

Which statement is true?
1) $B$ and $C$ have the same zeros.
2) $A$ and $B$ have the same $y$-intercept.
3) $B$ has a minimum and $C$ has a maximum.
4) $C$ has a maximum and $A$ has a minimum.

264 Bamboo plants can grow 91 centimeters per day. What is the approximate growth of the plant, in inches per hour?
1) 1.49
2) 3.79
3) 9.63
4) 35.83

265 The formula for electrical power, $P$, is $P = I^2R$, where $I$ is current and $R$ is resistance. The formula for $I$ in terms of $P$ and $R$ is

1) $I = \left(\dfrac{P}{R}\right)^2$

2) $I = \sqrt{\dfrac{P}{R}}$

3) $I = (P - R)^2$

4) $I = \sqrt{P - R}$

266 Voting rates in presidential elections from 1996-2012 are modeled below.
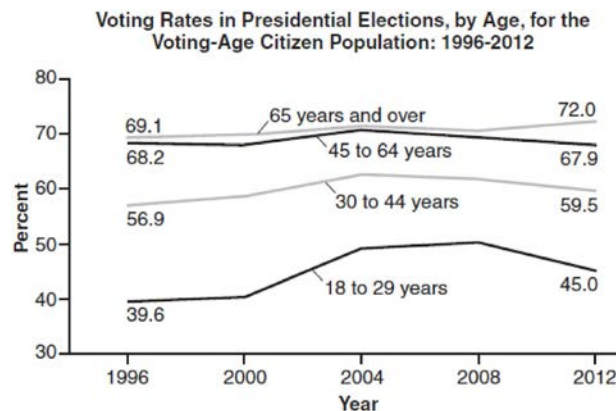


Which statement does *not* correctly interpret voting rates by age based on the given graph?
1) For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.
2) From 1996-2012, the average rate of change was positive for only two age groups.
3) About 70% of people 45 and older voted in the 2004 election.
4) The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.

267 The length, width, and height of a rectangular box are represented by $2x$, $3x + 1$, and $5x - 6$, respectively. When the volume is expressed as a polynomial in standard form, what is the coefficient of the 2nd term?
1) $-13$
2) 13
3) $-26$
4) 26

268  The quadratic functions $r(x)$ and $q(x)$ are given below.

| $x$ | $r(x)$ |
|-----|--------|
| $-4$ | $-12$ |
| $-3$ | $-15$ |
| $-2$ | $-16$ |
| $-1$ | $-15$ |
| $0$ | $-12$ |
| $1$ | $7$ |

$$q(x) = x^2 + 2x - 8$$

The function with the *smaller* minimum value is
1)  $q(x)$, and the value is $-9$
2)  $q(x)$, and the value is $-1$
3)  $r(x)$, and the value is $-16$
4)  $r(x)$, and the value is $-2$

269  Given:  $f(x) = (x-2)^2 + 4$
   $g(x) = (x-5)^2 + 4$
When compared to the graph of $f(x)$, the graph of $g(x)$ is
1)  shifted 3 units to the left
2)  shifted 3 units to the right
3)  shifted 5 units to the left
4)  shifted 5 units to the right

270  The function $g(x)$ is defined as $g(x) = -2x^2 + 3x$. The value of $g(-3)$ is
1)  $-27$
2)  $-9$
3)  $27$
4)  $45$

271  The graphs of $y = x^2 - 3$ and $y = 3x - 4$ intersect at approximately
1)  $(0.38, -2.85)$, only
2)  $(2.62, 3.85)$, only
3)  $(0.38, -2.85)$ and $(2.62, 3.85)$
4)  $(0.38, -2.85)$ and $(3.85, 2.62)$

272  Which situation can be modeled by a linear function?
1)  The population of bacteria triples every day.
2)  The value of a cell phone depreciates at a rate of 3.5% each year.
3)  An amusement park allows 50 people to enter every 30 minutes.
4)  A baseball tournament eliminates half of the teams after each round.

273 The functions $f(x)$ and $g(x)$ are graphed on the set of axes below.
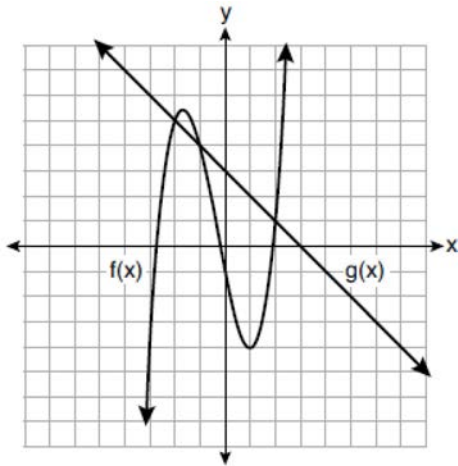


For which value of $x$ is $f(x) \neq g(x)$?
1) −1
2) 2
3) 3
4) −2

274 Alicia purchased $H$ half-gallons of ice cream for $3.50 each and $P$ packages of ice cream cones for $2.50 each. She purchased 14 items and spent $43. Which system of equations could be used to determine how many of each item Alicia purchased?
1) $3.50H + 2.50P = 43$
   $H + P = 14$
2) $3.50P + 2.50H = 43$
   $P + H = 14$
3) $3.50H + 2.50P = 14$
   $H + P = 43$
4) $3.50P + 2.50H = 14$
   $P + H = 43$

275 During physical education class, Andrew recorded the exercise times in minutes and heart rates in beats per minute (bpm) of four of his classmates. Which table best represents a linear model of exercise time and heart rate?

Student 1

| Exercise Time (in minutes) | Heart Rate (bpm) |
|---|---|
| 0 | 60 |
| 1 | 65 |
| 2 | 70 |
| 3 | 75 |
| 4 | 80 |

1)

Student 2

| Exercise Time (in minutes) | Heart Rate (bpm) |
|---|---|
| 0 | 62 |
| 1 | 70 |
| 2 | 83 |
| 3 | 88 |
| 4 | 90 |

2)

Student 3

| Exercise Time (in minutes) | Heart Rate (bpm) |
|---|---|
| 0 | 58 |
| 1 | 65 |
| 2 | 70 |
| 3 | 75 |
| 4 | 79 |

3)

Student 4

| Exercise Time (in minutes) | Heart Rate (bpm) |
|---|---|
| 0 | 62 |
| 1 | 65 |
| 2 | 66 |
| 3 | 73 |
| 4 | 75 |

4)

276 Gretchen has $50 that she can spend at the fair. Ride tickets cost $1.25 each and game tickets cost $2 each. She wants to go on a minimum of 10 rides and play at least 12 games. Which system of inequalities represents this situation when $r$ is the number of ride tickets purchased and $g$ is the number of game tickets purchased?

1) $1.25r + 2g < 50$

   $r \le 10$

   $g > 12$

2) $1.25r + 2g \le 50$

   $r \ge 10$

   $g \ge 12$

3) $1.25r + 2g \le 50$

   $r \ge 10$

   $g > 12$

4) $1.25r + 2g < 50$

   $r \le 10$

   $g \ge 12$

277 What is the range of the box plot shown below?
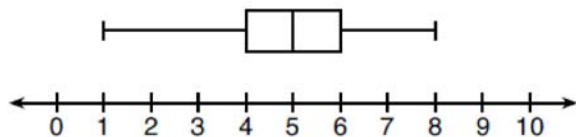


1) 7
2) 2
3) 3
4) 4

278 If $k(x) = 2x^2 - 3\sqrt{x}$, then $k(9)$ is
1) 315
2) 307
3) 159
4) 153

279 An outdoor club conducted a survey of its members. The members were asked to state their preference between skiing and snowboarding. Each member had to pick one. Of the 60 males, 45 stated they preferred to snowboard. Twenty-two of the 60 females preferred to ski. What is the relative frequency that a male prefers to ski?
1) 0.125
2) 0.25
3) $0.\overline{333}$
4) $0.\overline{405}$

280 The expression $-4.9t^2 + 50t + 2$ represents the height, in meters, of a toy rocket $t$ seconds after launch. The initial height of the rocket, in meters, is
1) 0
2) 2
3) 4.9
4) 50

281 When $(x)(x - 5)(2x + 3)$ is expressed as a polynomial in standard form, which statement about the resulting polynomial is true?
1) The constant term is 2.
2) The leading coefficient is 2.
3) The degree is 2.
4) The number of terms is 2.

282 Which of the three situations given below is best modeled by an exponential function?
I.   A bacteria culture doubles in size every day.
II.  A plant grows by 1 inch every 4 days.
III. The population of a town declines by 5% every 3 years.
1) I, only
2) II, only
3) I and II
4) I and III

52

283 The following table shows the heights, in inches, of the players on the opening-night roster of the 2015-2016 New York Knicks.

| 84 | 80 | 87 | 75 | 77 | 79 | 80 | 74 | 76 | 80 | 80 | 82 | 82 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|

The population standard deviation of these data is approximately
1) 3.5
2) 13
3) 79.7
4) 80

284 The scatter plot below shows the relationship between the number of members in a family and the amount of the family's weekly grocery bill.
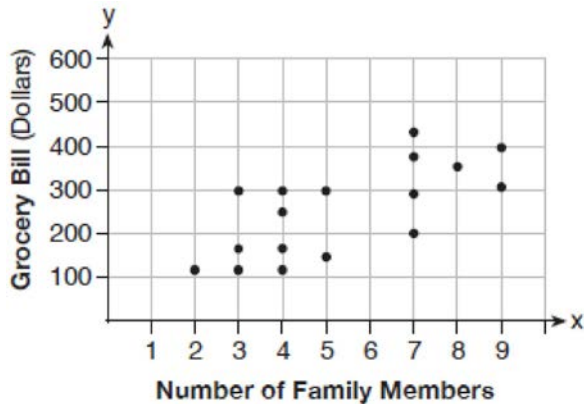


The most appropriate prediction of the grocery bill for a family that consists of six members is
1) $100
2) $300
3) $400
4) $500

285 Which interval represents the range of the function $h(x) = 2x^2 - 2x - 4$?
1) $(0.5, \infty)$
2) $(-4.5, \infty)$
3) $[0.5, \infty)$
4) $[-4.5, \infty)$

286 The area of a rectangle is represented by $3x^2 - 10x - 8$. Which expression can also be used to represent the area of the same rectangle?
1) $(3x + 2)(x - 4)$
2) $(3x + 2)(x + 4)$
3) $(3x + 4)(x - 2)$
4) $(3x - 4)(x + 2)$

287 Britney is solving a quadratic equation. Her first step is shown below.

Problem: $3x^2 - 8 - 10x = 3(2x + 3)$

Step 1: $3x^2 - 10x - 8 = 6x + 9$

Which two properties did Britney use to get to step 1?
 I. addition property of equality
 II. commutative property of addition
 III. multiplication property of equality
 IV. distributive property of multiplication over addition
1) I and III
2) I and IV
3) II and III
4) II and IV

288 If $a_1 = 6$ and $a_n = 3 + 2(a_{n-1})^2$, then $a_2$ equals
1) 75
2) 147
3) 180
4) 900

53

289 On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?
1) 65
2) 67
3) 69
4) 71

290 Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter, $p = 2\ell + 2w$. Three of their responses are shown below.

I. $\ell = \dfrac{1}{2}p - w$

II. $\ell = \dfrac{1}{2}(p - 2w)$

III. $\ell = \dfrac{p - 2w}{2}$

Which responses are correct?
1) I and II, only
2) II and III, only
3) I and III, only
4) I, II, and III

291 Bryan's hockey team is purchasing jerseys. The company charges $250 for a onetime set-up fee and $23 for each printed jersey. Which expression represents the total cost of $x$ number of jerseys for the team?
1) $23x$
2) $23 + 250x$
3) $23x + 250$
4) $23(x + 250)$

292 The expression $4x^2 - 25$ is equivalent to
1) $(4x - 5)(x + 5)$
2) $(4x + 5)(x - 5)$
3) $(2x + 5)(2x - 5)$
4) $(2x - 5)(2x - 5)$

293 When the function $g(x) = \begin{cases} 5x, \ x \le 3 \\ x^2 + 4, \ x > 3 \end{cases}$ is graphed correctly, how should the points be drawn on the graph for an $x$-value of 3?
1) open circles at $(3, 15)$ and $(3, 13)$
2) closed circles at $(3, 15)$ and $(3, 13)$
3) an open circle at $(3, 15)$ and a closed circle at $(3, 13)$
4) a closed circle at $(3, 15)$ and an open circle at $(3, 13)$

294 First consider the system of equations $y = -\dfrac{1}{2}x + 1$ and $y = x - 5$. Then consider the system of inequalities $y > -\dfrac{1}{2}x + 1$ and $y < x - 5$. When comparing the number of solutions in each of these systems, which statement is true?
1) Both systems have an infinite number of solutions.
2) The system of equations has more solutions.
3) The system of inequalities has more solutions.
4) Both systems have only one solution.

295 When written in factored form, $4w^2 - 11w - 3$ is equivalent to
1) $(2w + 1)(2w - 3)$
2) $(2w - 1)(2w + 3)$
3) $(4w + 1)(w - 3)$
4) $(4w - 1)(w + 3)$

296 A polynomial function is graphed below.



f(x)
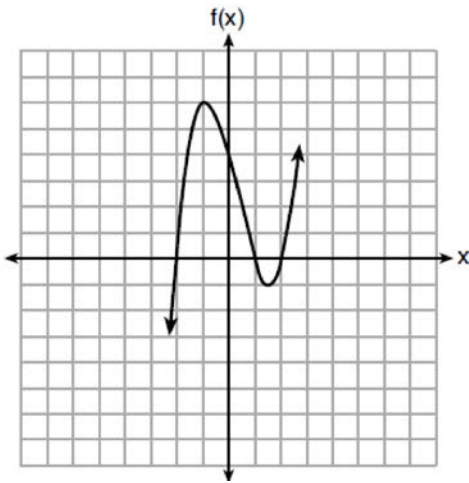
Which function could represent this graph?

1) $f(x) = (x + 1)(x^2 + 2)$
2) $f(x) = (x - 1)(x^2 - 2)$
3) $f(x) = (x - 1)(x^2 - 4)$
4) $f(x) = (x + 1)(x^2 + 4)$

297 Given the parent function $f(x) = x^3$, the function $g(x) = (x - 1)^3 - 2$ is the result of a shift of $f(x)$

1) 1 unit left and 2 units down
2) 1 unit left and 2 units up
3) 1 unit right and 2 units down
4) 1 unit right and 2 units up

298 If the domain of the function $f(x) = 2x^2 - 8$ is $\{-2, 3, 5\}$, then the range is

1) $\{-16, 4, 92\}$
2) $\{-16, 10, 42\}$
3) $\{0, 10, 42\}$
4) $\{0, 4, 92\}$

299 When $3a + 7b > 2a - 8b$ is solved for $a$, the result is

1) $a > -b$
2) $a < -b$
3) $a < -15b$
4) $a > -15b$

300 Ian is saving up to buy a new baseball glove. Every month he puts $10 into a jar. Which type of function best models the total amount of money in the jar after a given number of months?

1) linear
2) exponential
3) quadratic
4) square root

301 The functions $f(x)$ and $g(x)$ are graphed below.
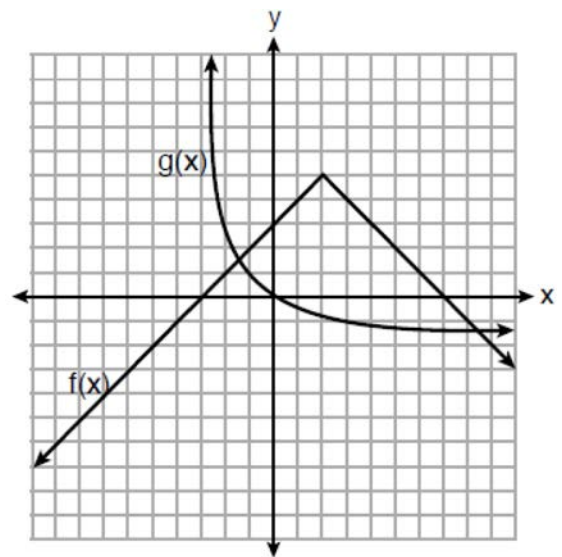


Based on the graph, the solutions to the equation $f(x) = g(x)$ are

1) the $x$-intercepts
2) the $y$-intercepts
3) the $x$-values of the points of intersection
4) the $y$-values of the points of intersection

302 Olivia entered a baking contest. As part of the contest, she needs to demonstrate how to measure a gallon of milk if she only has a teaspoon measure. She converts the measurement using the ratios below:

$$\frac{4 \text{ quarts}}{1 \text{ gallon}} \bullet \frac{2 \text{ pints}}{1 \text{ quart}} \bullet \frac{2 \text{ cups}}{1 \text{ pint}} \bullet \frac{\frac{1}{4} \text{ cup}}{4 \text{ tablespoons}} \bullet \frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$$

Which ratio is *incorrectly* written in Olivia's conversion?

1) $\dfrac{4 \text{ quarts}}{1 \text{ gallon}}$

2) $\dfrac{2 \text{ pints}}{1 \text{ quart}}$

3) $\dfrac{\frac{1}{4} \text{ cup}}{4 \text{ tablespoons}}$

4) $\dfrac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$

303 If the pattern below continues, which equation(s) is a recursive formula that represents the number of squares in this sequence?



Design 1    Design 2    Design 3    Design 4

1) $y = 2x + 1$
2) $y = 2x + 3$
3) $a_1 = 3$

   $a_n = a_{n-1} + 2$
4) $a_1 = 1$

   $a_n = a_{n-1} + 2$

304 Which polynomial is twice the sum of $4x^2 - x + 1$ and $-6x^2 + x - 4$?

1) $-2x^2 - 3$
2) $-4x^2 - 3$
3) $-4x^2 - 6$
4) $-2x^2 + x - 5$

305 If the function $f(x) = x^2$ has the domain $\{0, 1, 4, 9\}$, what is its range?

1) $\{0, 1, 2, 3\}$
2) $\{0, 1, 16, 81\}$
3) $\{0, -1, 1, -2, 2, -3, 3\}$
4) $\{0, -1, 1, -16, 16, -81, 81\}$

306 The expression $3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5)$ is equivalent to

1) $-13x - 22x + 11$
2) $-13x^2 + 34x - 29$
3) $19x^2 - 22x + 11$
4) $19x^2 + 34x - 29$

307 What is the solution to the equation

$$\frac{3}{5}\left(x + \frac{4}{3}\right) = 1.04?$$

1) $3.0\overline{6}$
2) $0.4$
3) $-0.4\overline{8}$
4) $-0.709\overline{3}$

56

308 Jenna took a survey of her senior class to see whether they preferred pizza or burgers. The results are summarized in the table below.

| | Pizza | Burgers |
|---|---|---|
| **Male** | 23 | 42 |
| **Female** | 31 | 26 |

Of the people who preferred burgers, approximately what percentage were female?
1) 21.3
2) 38.2
3) 45.6
4) 61.9

309 The length of a rectangular patio is 7 feet more than its width, $w$. The area of a patio, $A(w)$, can be represented by the function
1) $A(w) = w + 7$
2) $A(w) = w^2 + 7w$
3) $A(w) = 4w + 14$
4) $A(w) = 4w^2 + 28w$

310 Lizzy has 30 coins that total $4.80. All of her coins are dimes, $D$, and quarters, $Q$. Which system of equations models this situation?
1) $D + Q = 4.80$
   $.10D + .25Q = 30$
2) $D + Q = 30$
   $.10D + .25Q = 4.80$
3) $D + Q = 30$
   $.25D + .10Q = 4.80$
4) $D + Q = 4.80$
   $.25D + .10Q = 30$

311 A ball is thrown into the air from the top of a building. The height, $h(t)$, of the ball above the ground $t$ seconds after it is thrown can be modeled by $h(t) = -16t^2 + 64t + 80$. How many seconds after being thrown will the ball hit the ground?
1) 5
2) 2
3) 80
4) 144

312 David correctly factored the expression $m^2 - 12m - 64$. Which expression did he write?
1) $(m - 8)(m - 8)$
2) $(m - 8)(m + 8)$
3) $(m - 16)(m + 4)$
4) $(m + 16)(m - 4)$

313 The function $f(x) = 2x^2 + 6x - 12$ has a domain consisting of the integers from $-2$ to $1$, inclusive. Which set represents the corresponding range values for $f(x)$?
1) $\{-32, -20, -12, -4\}$
2) $\{-16, -12, -4\}$
3) $\{-32, -4\}$
4) $\{-16, -4\}$

314 Three functions are shown below.



f(x)
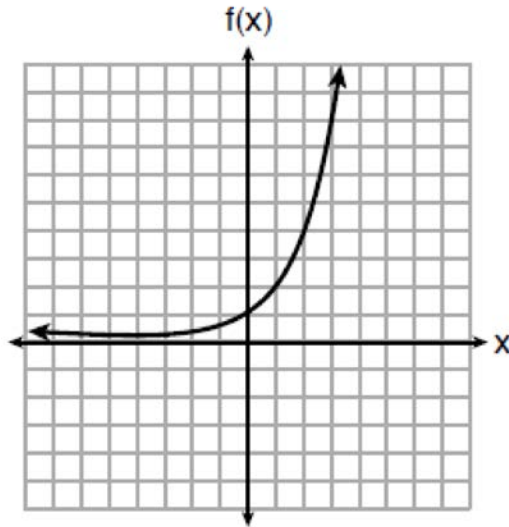
$$g(x) = 3^x + 2$$

| x | h(x) |
|----|-------|
| −5 | 30 |
| −4 | 14 |
| −3 | 6 |
| −2 | 2 |
| −1 | 0 |
| 0 | −1 |
| 1 | −1.5 |
| 2 | −1.75 |

Which statement is true?

1) The y-intercept for $h(x)$ is greater than the y-intercept for $f(x)$.

2) The y-intercept for $f(x)$ is greater than the y-intercept for $g(x)$.

3) The y-intercept for $h(x)$ is greater than the y-intercept for both $g(x)$ and $f(x)$.

4) The y-intercept for $g(x)$ is greater than the y-intercept for both $f(x)$ and $h(x)$.

315 The product of $\sqrt{576}$ and $\sqrt{684}$ is
1) irrational because both factors are irrational
2) rational because both factors are rational
3) irrational because one factor is irrational
4) rational because one factor is rational

316 If $a_n = n\left(a_{n-1}\right)$ and $a_1 = 1$, what is the value of $a_5$?
1) 5
2) 20
3) 120
4) 720

317  The functions $f(x)$, $q(x)$, and $p(x)$ are shown below.



f(x)
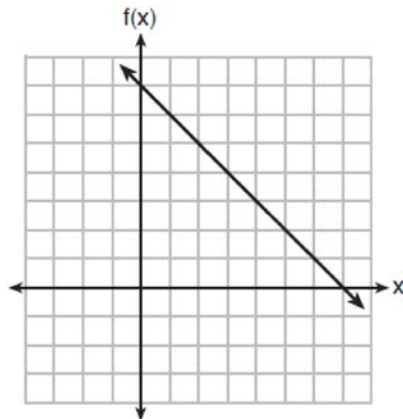
$$q(x) = (x-1)^2 - 6$$

| x | p(x) |
|---|------|
| 2 | 5 |
| 3 | 4 |
| 4 | 3 |
| 5 | 4 |
| 6 | 5 |

When the input is 4, which functions have the same output value?

1)  $f(x)$ and $q(x)$, only
2)  $f(x)$ and $p(x)$, only
3)  $q(x)$ and $p(x)$, only
4)  $f(x)$, $q(x)$, and $p(x)$

318  The population of a city can be modeled by $P(t) = 3810(1.0005)^{7t}$, where $P(t)$ is the population after $t$ years.  Which function is approximately equivalent to $P(t)$?

1)  $P(t) = 3810(0.1427)^t$
2)  $P(t) = 3810(1.0035)^t$
3)  $P(t) = 26,670(0.1427)^t$
4)  $P(t) = 26,670(1.0035)^t$

319  Which expression results in a rational number?

1)  $\sqrt{2} \cdot \sqrt{18}$
2)  $5 \cdot \sqrt{5}$
3)  $\sqrt{2} + \sqrt{2}$
4)  $3\sqrt{2} + 2\sqrt{3}$

320 What are the solutions to the equation $3(x-4)^2 = 27$?
1) 1 and 7
2) −1 and −7
3) $4 \pm \sqrt{24}$
4) $-4 \pm \sqrt{24}$

321 The roots of $x^2 - 5x - 4 = 0$ are
1) 1 and 4
2) $\dfrac{5 \pm \sqrt{41}}{2}$
3) −1 and −4
4) $\dfrac{-5 \pm \sqrt{41}}{2}$

322 Compared to the graph of $f(x) = x^2$, the graph of $g(x) = (x-2)^2 + 3$ is the result of translating $f(x)$
1) 2 units up and 3 units right
2) 2 units down and 3 units up
3) 2 units right and 3 units up
4) 2 units left and 3 units right

323 If $f(x) = 2x^2 + x - 3$, which equation can be used to determine the zeros of the function?
1) $0 = (2x-3)(x+1)$
2) $0 = (2x+3)(x-1)$
3) $0 = 2x(x+1) - 3$
4) $0 = 2x(x-1) - 3(x+1)$

324 Which function could be used to represent the sequence $8, 20, 50, 125, 312.5, \ldots$, given that $a_1 = 8$?
1) $a_n = a_{n-1} + a_1$
2) $a_n = 2.5(a_{n-1})$
3) $a_n = a_1 + 1.5(a_{n-1})$
4) $a_n = (a_1)(a_{n-1})$

325 The solution to $4p + 2 < 2(p + 5)$ is
1) $p > -6$
2) $p < -6$
3) $p > 4$
4) $p < 4$

326 A population of bacteria can be modeled by the function $f(t) = 1000(0.98)^t$, where $t$ represents the time since the population started decaying, and $f(t)$ represents the population of the remaining bacteria at time $t$. What is the rate of decay for this population?
1) 98%
2) 2%
3) 0.98%
4) 0.02%

327 The expression $w^4 - 36$ is equivalent to
1) $(w^2 - 18)(w^2 - 18)$
2) $(w^2 + 18)(w^2 - 18)$
3) $(w^2 - 6)(w^2 - 6)$
4) $(w^2 + 6)(w^2 - 6)$

60

328 Each day, a local dog shelter spends an average of $2.40 on food per dog. The manager estimates the shelter's daily expenses, assuming there is at least one dog in the shelter, using the function $E(x) = 30 + 2.40x$. Which statements regarding the function $E(x)$ are correct?

I.  $x$ represents the number of dogs at the shelter per day.

II.  $x$ represents the number of volunteers at the shelter per day.

III. 30 represents the shelter's total expenses per day.

IV. 30 represents the shelter's nonfood expenses per day.

1)  I and III
2)  I and IV
3)  II and III
4)  II and IV

329 The function $f(x)$ is graphed below.

f(x)
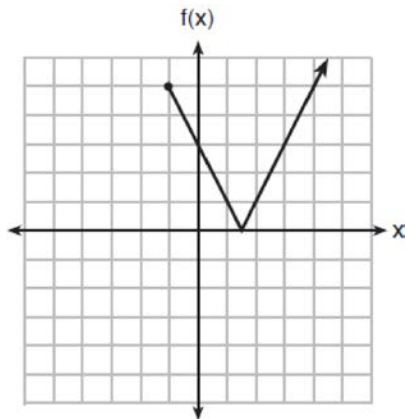


The domain of this function is
1)  all positive real numbers
2)  all positive integers
3)  $x \geq 0$
4)  $x \geq -1$

330 How many real-number solutions does $4x^2 + 2x + 5 = 0$ have?
1)  one
2)  two
3)  zero
4)  infinitely many

331 A relation is graphed on the set of axes below.
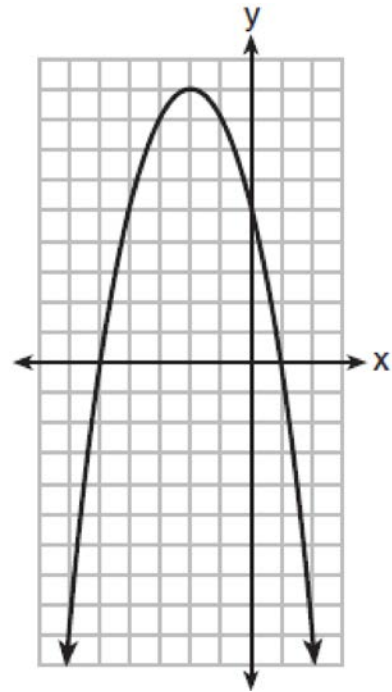


Based on this graph, the relation is
1)  a function because it passes the horizontal line test
2)  a function because it passes the vertical line test
3)  not a function because it fails the horizontal line test
4)  not a function because it fails the vertical line test

332 The 15 members of the French Club sold candy bars to help fund their trip to Quebec. The table below shows the number of candy bars each member sold.

| Number of Candy Bars Sold | | | | |
|---|---|---|---|---|
| 0 | 35 | 38 | 41 | 43 |
| 45 | 50 | 53 | 53 | 55 |
| 68 | 68 | 68 | 72 | 120 |

When referring to the data, which statement is *false*?
1) The mode is the best measure of central tendency for the data.
2) The data have two outliers.
3) The median is 53.
4) The range is 120.

333 Which equation is equivalent to $y = x^2 + 24x - 18$?
1) $y = (x + 12)^2 - 162$
2) $y = (x + 12)^2 + 126$
3) $y = (x - 12)^2 - 162$
4) $y = (x - 12)^2 + 126$

334 Nora inherited a savings account that was started by her grandmother 25 years ago. This scenario is modeled by the function $A(t) = 5000(1.013)^{t+25}$, where $A(t)$ represents the value of the account, in dollars, $t$ years after the inheritance. Which function below is equivalent to $A(t)$?
1) $A(t) = 5000[(1.013^t)]^{25}$
2) $A(t) = 5000[(1.013)^t + (1.013)^{25}]$
3) $A(t) = (5000)^t (1.013)^{25}$
4) $A(t) = 5000(1.013)^t (1.013)^{25}$

335 The graph of $y = \frac{1}{2}x^2 - x - 4$ is shown below. The points $A(-2,0)$, $B(0,-4)$, and $C(4,0)$ lie on this graph.



Which of these points can determine the zeros of the equation $y = \frac{1}{2}x^2 - x - 4$?
1) $A$, only
2) $B$, only
3) $A$ and $C$, only
4) $A$, $B$, and $C$

336 Which situation is *not* a linear function?
1) A gym charges a membership fee of $10.00 down and $10.00 per month.
2) A cab company charges $2.50 initially and $3.00 per mile.
3) A restaurant employee earns $12.50 per hour.
4) A $12,000 car depreciates 15% per year.

337 The value of $x$ that satisfies the equation $\frac{4}{3} = \frac{x+10}{15}$ is
1) −6
2) 5
3) 10
4) 30

338 A cubic function is graphed on the set of axes below.
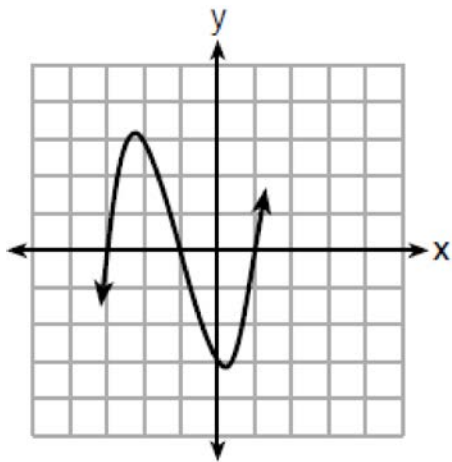


Which function could represent this graph?
1) $f(x) = (x-3)(x-1)(x+1)$
2) $g(x) = (x+3)(x+1)(x-1)$
3) $h(x) = (x-3)(x-1)(x+3)$
4) $k(x) = (x+3)(x+1)(x-3)$

339 If $y = 3x^3 + x^2 - 5$ and $z = x^2 - 12$, which polynomial is equivalent to $2(y+z)$?
1) $6x^3 + 4x^2 - 34$
2) $6x^3 + 3x^2 - 17$
3) $6x^3 + 3x^2 - 22$
4) $6x^3 + 2x^2 - 17$

340 The math department needs to buy new textbooks and laptops for the computer science classroom. The textbooks cost $116.00 each, and the laptops cost $439.00 each. If the math department has $6500 to spend and purchases 30 textbooks, how many laptops can they buy?
1) 6
2) 7
3) 11
4) 12

341 The trinomial $x^2 - 14x + 49$ can be expressed as
1) $(x-7)^2$
2) $(x+7)^2$
3) $(x-7)(x+7)$
4) $(x-7)(x+2)$

342 A function is defined as $\{(0,1),(2,3),(5,8),(7,2)\}$. Isaac is asked to create one more ordered pair for the function. Which ordered pair can he add to the set to keep it a function?
1) $(0,2)$
2) $(5,3)$
3) $(7,0)$
4) $(1,3)$

343 The table below shows the weights of Liam's pumpkin, $l(w)$, and Patricia's pumpkin, $p(w)$, over a four-week period where $w$ represents the number of weeks. Liam's pumpkin grows at a constant rate. Patricia's pumpkin grows at a weekly rate of approximately 52%.

| Weeks w | Weight in Pounds l(w) | Weight in Pounds p(w) |
|---|---|---|
| 6 | 2.4 | 2.5 |
| 7 | 5.5 | 3.8 |
| 8 | 8.6 | 5.8 |
| 9 | 11.7 | 8.8 |

Assume the pumpkins continue to grow at these rates through week 13. When comparing the weights of both Liam's and Patricia's pumpkins in week 10 and week 13, which statement is true?

1) Liam's pumpkin will weigh more in week 10 and week 13.

2) Patricia's pumpkin will weigh more in week 10 and week 13.

3) Liam's pumpkin will weigh more in week 10, and Patricia's pumpkin will weigh more in week 13.

4) Patricia's pumpkin will weigh more in week 10, and Liam's pumpkin will weigh more in week 13.

344 A survey was given to 12th-grade students of West High School to determine the location for the senior class trip. The results are shown in the table below.

| | Niagara Falls | Darien Lake | New York City |
|---|---|---|---|
| **Boys** | 56 | 74 | 103 |
| **Girls** | 71 | 92 | 88 |

To the *nearest percent*, what percent of the boys chose Niagara Falls?
1) 12                    3) 44
2) 24                    4) 56

345 Joy wants to buy strawberries and raspberries to bring to a party. Strawberries cost $1.60 per pound and raspberries cost $1.75 per pound. If she only has $10 to spend on berries, which inequality represents the situation where she buys $x$ pounds of strawberries and $y$ pounds of raspberries?
1) $1.60x + 1.75y \leq 10$
2) $1.60x + 1.75y \geq 10$
3) $1.75x + 1.60y \leq 10$
4) $1.75x + 1.60y \geq 10$

346 A grocery store sells packages of beef. The function $C(w)$ represents the cost, in dollars, of a package of beef weighing $w$ pounds. The most appropriate domain for this function would be
1) integers
2) rational numbers
3) positive integers
4) positive rational numbers

347 The solution to $-2(1-4x) = 3x+8$ is

1) $\dfrac{6}{11}$

2) $2$

3) $-\dfrac{10}{7}$

4) $-2$

348 The height of a ball Doreen tossed into the air can be modeled by the function $h(x) = -4.9x^2 + 6x + 5$, where $x$ is the time elapsed in seconds, and $h(x)$ is the height in meters. The number 5 in the function represents

1) the initial height of the ball
2) the time at which the ball reaches the ground
3) the time at which the ball was at its highest point
4) the maximum height the ball attained when thrown in the air

349 Which expression results in a rational number?

1) $\sqrt{121} - \sqrt{21}$
2) $\sqrt{25} \cdot \sqrt{50}$
3) $\sqrt{36} \div \sqrt{225}$
4) $3\sqrt{5} + 2\sqrt{5}$

350 Using the substitution method, Vito is solving the following system of equations algebraically:
$$y + 3x = -4$$
$$2x - 3y = -21$$
Which equivalent equation could Vito use?

1) $2(-3x-4) + 3x = -21$
2) $2(3x-4) + 3x = -21$
3) $2x - 3(-3x-4) = -21$
4) $2x - 3(3x-4) = -21$

351 When solving the equation
$$12x^2 - 7x = 6 - 2(x^2 - 1), \text{ Evan wrote}$$
$12x^2 - 7x = 6 - 2x^2 + 2$ as his first step. Which property justifies this step?

1) subtraction property of equality
2) multiplication property of equality
3) associative property of multiplication
4) distributive property of multiplication over subtraction

352 The number of bacteria grown in a lab can be modeled by $P(t) = 300 \bullet 2^{4t}$, where $t$ is the number of hours. Which expression is equivalent to $P(t)$?

1) $300 \bullet 8^t$
2) $300 \bullet 16^t$
3) $300^t \bullet 2^4$
4) $300^{2t} \bullet 2^{2t}$

353 Mrs. Allard asked her students to identify which of the polynomials below are in standard form and explain why.

 I. $15x^4 - 6x + 3x^2 - 1$

 II. $12x^3 + 8x + 4$

 III. $2x^5 + 8x^2 + 10x$

Which student's response is correct?

1) Tyler said I and II because the coefficients are decreasing.
2) Susan said only II because all the numbers are decreasing.
3) Fred said II and III because the exponents are decreasing.
4) Alyssa said II and III because they each have three terms.

354 Which graph does *not* represent a function that is always increasing over the entire interval $-2 < x < 2$?

1)



2)



3)



4)
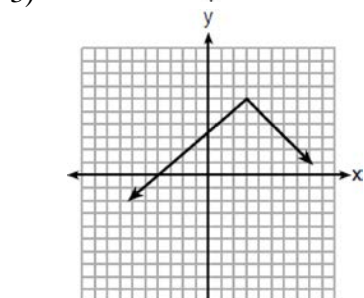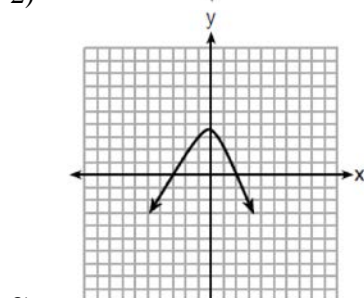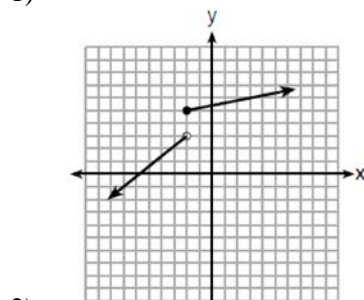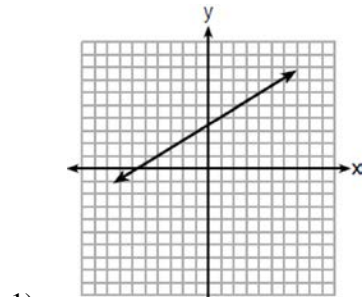


355 If $C = 2a^2 - 5$ and $D = 3 - a$, then $C - 2D$ equals
1) $2a^2 + a - 8$
2) $2a^2 - a - 8$
3) $2a^2 + 2a - 11$
4) $2a^2 - a - 11$

356 The following conversion was done correctly:
$$\frac{3\,\text{miles}}{1\,\text{hour}} \bullet \frac{1\,\text{hour}}{60\,\text{minutes}} \bullet \frac{5280\,\text{feet}}{1\,\text{mile}} \bullet \frac{12\,\text{inches}}{1\,\text{foot}}$$
What were the final units for this conversion?
1) minutes per foot
2) minutes per inch
3) feet per minute
4) inches per minute

357 If the original function $f(x) = 2x^2 - 1$ is shifted to the left 3 units to make the function $g(x)$, which expression would represent $g(x)$?
1) $2(x - 3)^2 - 1$
2) $2(x + 3)^2 - 1$
3) $2x^2 + 2$
4) $2x^2 - 4$

358 The quadratic equation $x^2 - 6x = 12$ is rewritten in the form $(x + p)^2 = q$, where $q$ is a constant. What is the value of $p$?
1) $-12$
2) $-9$
3) $-3$
4) $9$

359 Given the following three sequences:
    I.  $2,4,6,8,10...$
    II.  $2,4,8,16,32...$
    III.  $a, a+2, a+4, a+6, a+8...$
Which ones are arithmetic sequences?
1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

360 A dolphin jumps out of the water and then back into the water. His jump could be graphed on a set of axes where $x$ represents time and $y$ represents distance above or below sea level. The domain for this graph is best represented using a set of
1) integers
2) positive integers
3) real numbers
4) positive real numbers

361 The zeros of the function $p(x) = x^2 - 2x - 24$ are
1) $-8$ and $3$
2) $-6$ and $4$
3) $-4$ and $6$
4) $-3$ and $8$

362 At an ice cream shop, the profit, $P(c)$, is modeled by the function $P(c) = 0.87c$, where $c$ represents the number of ice cream cones sold. An appropriate domain for this function is
1) an integer $\le 0$
2) an integer $\ge 0$
3) a rational number $\le 0$
4) a rational number $\ge 0$

363 The value of $x$ which makes
$\frac{2}{3}\left(\frac{1}{4}x - 2\right) = \frac{1}{5}\left(\frac{4}{3}x - 1\right)$ true is
1) $-10$
2) $-2$
3) $-9.\overline{09}$
4) $-11.\overline{3}$

364 When solving $p^2 + 5 = 8p - 7$, Kate wrote $p^2 + 12 = 8p$. The property she used is
1) the associative property
2) the commutative property
3) the distributive property
4) the addition property of equality

365 Which quadratic function has the largest maximum over the set of real numbers?
1) $f(x) = -x^2 + 2x + 4$
2)

| x | k(x) |
|---|---|
| −1 | −1 |
| 0 | 3 |
| 1 | 5 |
| 2 | 5 |
| 3 | 3 |
| 4 | −1 |

3) $g(x) = -(x - 5)^2 + 5$
4)

| x | h(x) |
|---|---|
| −2 | −9 |
| −1 | −3 |
| 0 | 1 |
| 1 | 3 |
| 2 | 3 |
| 3 | 1 |

366 Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

| | Basketball | Soccer | Tennis |
|---|---|---|---|
| **Girls** | 42 | 58 | 20 |
| **Boys** | 84 | 41 | 5 |

What percentage of the students chose soccer as their favorite sport?
1) 39.6%
2) 41.4%
3) 50.4%
4) 58.6%

367 Which system of linear equations has the same solution as the one shown below?
$$x - 4y = -10$$
$$x + y = 5$$
1) $5x = 10$
   $x + y = 5$
2) $-5y = -5$
   $x + y = 5$
3) $-3x = -30$
   $x + y = 5$
4) $-5y = -5$
   $x - 4y = -10$

368 Which expression is equivalent to $2(x^2 - 1) + 3x(x - 4)$?
1) $5x^2 - 5$
2) $5x^2 - 6$
3) $5x^2 - 12x - 1$
4) $5x^2 - 12x - 2$

369 The owner of a landscaping business wants to know how much time, on average, his workers spend mowing one lawn. Which is the most appropriate rate with which to calculate an answer to his question?
1) lawns per employee
2) lawns per day
3) employee per lawns
4) hours per lawn

370 The amount Mike gets paid weekly can be represented by the expression $2.50a + 290$, where $a$ is the number of cell phone accessories he sells that week. What is the constant term in this expression and what does it represent?
1) $2.50a$, the amount he is guaranteed to be paid each week
2) $2.50a$, the amount he earns when he sells $a$ accessories
3) 290, the amount he is guaranteed to be paid each week
4) 290, the amount he earns when he sells $a$ accessories

371 The function $f$ is shown in the table below.

| x | f(x) |
|---|------|
| 0 | 1 |
| 1 | 3 |
| 2 | 9 |
| 3 | 27 |

Which type of function best models the given data?
1) exponential growth function
2) exponential decay function
3) linear function with positive rate of change
4) linear function with negative rate of change

372 Which relation is *not* a function?

| x | y |
|-----|----|
| −10 | −2 |
| −6 | 2 |
| −2 | 6 |
| 1 | 9 |
| 5 | 13 |

1)
2) $3x + 2y = 4$
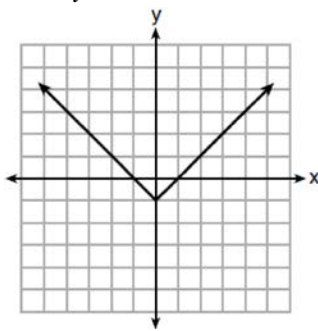


3)
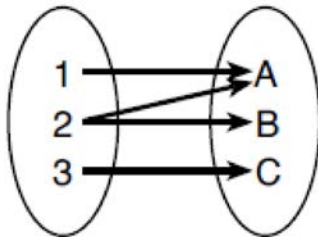


4)

373 Last weekend, Emma sold lemonade at a yard sale. The function $P(c) = .50c - 9.96$ represented the profit, $P(c)$, Emma earned selling $c$ cups of lemonade. Sales were strong, so she raised the price for this weekend by 25 cents per cup. Which function represents her profit for this weekend?
1) $P(c) = .25c - 9.96$
2) $P(c) = .50c - 9.71$
3) $P(c) = .50c - 10.21$
4) $P(c) = .75c - 9.96$

374 Which point is *not* in the solution set of the equation $3y + 2 = x^2 - 5x + 17$?
1) $(-2, 10)$
2) $(-1, 7)$
3) $(2, 3)$
4) $(5, 5)$

375 For the sequence $-27, -12, 3, 18, \ldots$, the expression that defines the $n$th term where $a_1 = -27$ is
1) $15 - 27n$
2) $15 - 27(n - 1)$
3) $-27 + 15n$
4) $-27 + 15(n - 1)$

376  The data obtained from a random sample of track athletes showed that as the foot size of the athlete decreased, the average running speed decreased. Which statement is best supported by the data?
   1)  Smaller foot sizes cause track athletes to run slower.
   2)  The sample of track athletes shows a causal relationship between foot size and running speed.
   3)  The sample of track athletes shows a correlation between foot size and running speed.
   4)  There is no correlation between foot size and running speed in track athletes.

377  Given the set $\{x \mid -2 \le x \le 2$, where $x$ is an integer$\}$, what is the solution of $-2(x-5) < 10$?
   1)  $0, 1, 2$
   2)  $1, 2$
   3)  $-2, -1, 0$
   4)  $-2, -1$

378  Josh graphed the function $f(x) = -3(x-1)^2 + 2$. He then graphed the function $g(x) = -3(x-1)^2 - 5$ on the same coordinate plane. The vertex of $g(x)$ is
   1)  7 units below the vertex of $f(x)$
   2)  7 units above the vertex of $f(x)$
   3)  7 units to the right of the vertex of $f(x)$
   4)  7 units to the left of the vertex of $f(x)$

379  Which pair of equations would have $(-1, 2)$ as a solution?
   1)  $y = x + 3$ and $y = 2^x$
   2)  $y = x - 1$ and $y = 2x$
   3)  $y = x^2 - 3x - 2$ and $y = 4x + 6$
   4)  $2x + 3y = -4$ and $y = -\dfrac{1}{2}x - \dfrac{3}{2}$

380  Which relation does *not* represent a function?

   1)
   | x | 1 | 2 | 3 | 4 | 5 | 6 |
   |---|---|---|---|---|---|---|
   | y | 3.2 | 4 | 5.1 | 6 | 7.4 | 8.8 |
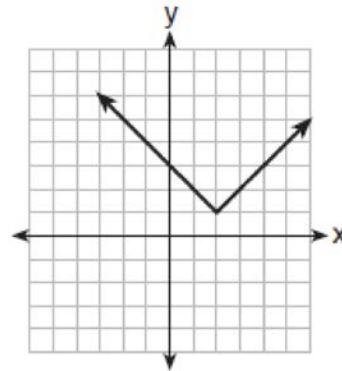
   2)


   3)  $y = 3\sqrt{x+1} - 2$
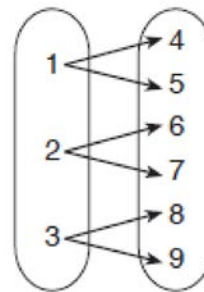
   4)


381  Materials $A$ and $B$ decay over time. The function for the amount of material $A$ is $A(t) = 1000(0.5)^{2t}$ and for the amount of material $B$ is $B(t) = 1000(0.25)^t$, where $t$ represents time in days. On which day will the amounts of material be equal?
   1)  initial day, only
   2)  day 2, only
   3)  day 5, only
   4)  every day

382  Given the functions $g(x)$, $f(x)$, and $h(x)$ shown below:

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

| $x$ | $f(x)$ |
|-----|--------|
| 0   | 1      |
| 1   | 2      |
| 2   | 5      |
| 3   | 7      |

h(x)
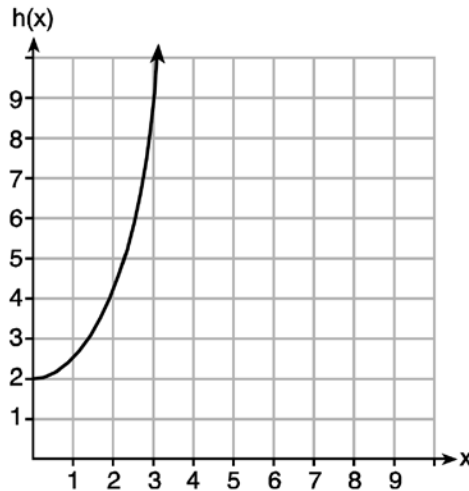


The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \le x \le 3$ is
1)  $f(x)$, $g(x)$, $h(x)$
2)  $h(x)$, $g(x)$, $f(x)$
3)  $g(x)$, $f(x)$, $h(x)$
4)  $h(x)$, $f(x)$, $g(x)$

383  Which equation has the same solution as
$x^2 + 8x - 33 = 0$?
1)  $(x+4)^2 = 49$
2)  $(x-4)^2 = 49$
3)  $(x+4)^2 = 17$
4)  $(x-4)^2 = 17$

384  Nicci's sister is 7 years less than twice Nicci's age, $a$. The sum of Nicci's age and her sister's age is 41. Which equation represents this relationship?
1)  $a + (7 - 2a) = 41$
2)  $a + (2a - 7) = 41$
3)  $2a - 7 = 41$
4)  $a = 2a - 7$

## Algebra I Multiple Choice Regents Exam Questions

385 Beverly did a study this past spring using data she collected from a cafeteria. She recorded data weekly for ice cream sales and soda sales. Beverly found the line of best fit and the correlation coefficient, as shown in the diagram below.

**Beverly's Cafeteria Study**



$r = .96$
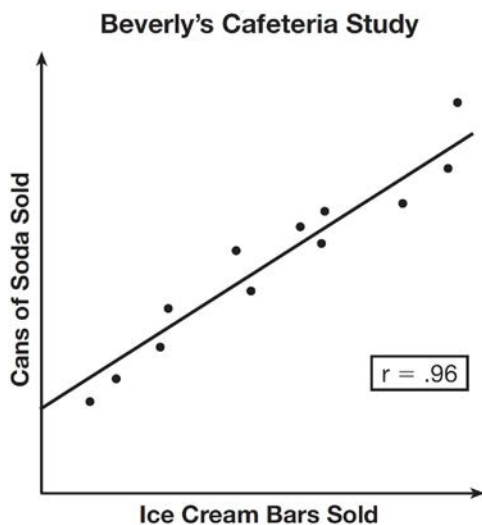
Given this information, which statement(s) can correctly be concluded?

I.   Eating more ice cream causes a person to become thirsty.

II.  Drinking more soda causes a person to become hungry.

III. There is a strong correlation between ice cream sales and soda sales.

1) I, only
2) III, only
3) I and III
4) II and III

386 The cost of airing a commercial on television is modeled by the function $C(n) = 110n + 900$, where $n$ is the number of times the commercial is aired. Based on this model, which statement is true?
1) The commercial costs $0 to produce and $110 per airing up to $900.
2) The commercial costs $110 to produce and $900 each time it is aired.
3) The commercial costs $900 to produce and $110 each time it is aired.
4) The commercial costs $1010 to produce and can air an unlimited number of times.

387 Four expressions are shown below.

$$\text{I} \qquad 2(2x^2 - 2x - 60)$$
$$\text{II} \qquad 4(x^2 - x - 30)$$
$$\text{III} \qquad 4(x + 6)(x - 5)$$
$$\text{IV} \qquad 4x(x - 1) - 120$$

The expression $4x^2 - 4x - 120$ is equivalent to
1) I and II, only
2) II and IV, only
3) I, II, and IV
4) II, III, and IV

388 The owner of a small computer repair business has one employee, who is paid an hourly rate of $22. The owner estimates his weekly profit using the function $P(x) = 8600 - 22x$. In this function, $x$ represents the number of
1) computers repaired per week
2) hours worked per week
3) customers served per week
4) days worked per week

72

389  When solving the equation $4(3x^2 + 2) - 9 = 8x^2 + 7$, Emily wrote $4(3x^2 + 2) = 8x^2 + 16$ as her first step. Which property justifies Emily's first step?
1) addition property of equality
2) commutative property of addition
3) multiplication property of equality
4) distributive property of multiplication over addition

390  The solution of the equation $(x + 3)^2 = 7$ is
1) $3 \pm \sqrt{7}$
2) $7 \pm \sqrt{3}$
3) $-3 \pm \sqrt{7}$
4) $-7 \pm \sqrt{3}$

391  During the 2010 season, football player McGee's earnings, $m$, were 0.005 million dollars more than those of his teammate Fitzpatrick's earnings, $f$. The two players earned a total of 3.95 million dollars. Which system of equations could be used to determine the amount each player earned, in millions of dollars?
1) $m + f = 3.95$
   $m + 0.005 = f$
2) $m - 3.95 = f$
   $f + 0.005 = m$
3) $f - 3.95 = m$
   $m + 0.005 = f$
4) $m + f = 3.95$
   $f + 0.005 = m$

392  Which inequality is represented in the graph below?
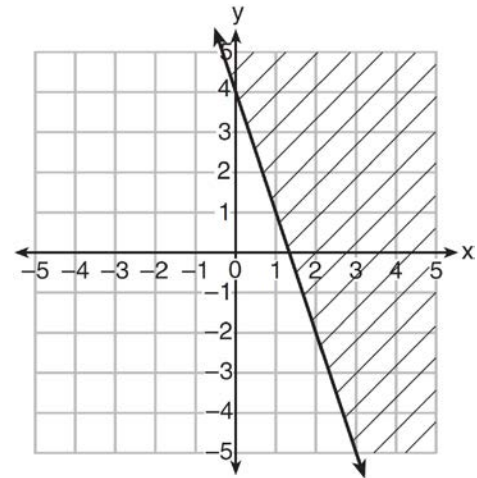


1) $y \geq -3x + 4$
2) $y \leq -3x + 4$
3) $y \geq -4x - 3$
4) $y \leq -4x - 3$

393  Natasha is planning a school celebration and wants to have live music and food for everyone who attends. She has found a band that will charge her $750 and a caterer who will provide snacks and drinks for $2.25 per person. If her goal is to keep the average cost per person between $2.75 and $3.25, how many people, $p$, must attend?
1) $225 < p < 325$
2) $325 < p < 750$
3) $500 < p < 1000$
4) $750 < p < 1500$

394 A laboratory technician studied the population growth of a colony of bacteria. He recorded the number of bacteria every other day, as shown in the partial table below.

| t (time, in days) | 0 | 2 | 4 |
|---|---|---|---|
| f(t) (bacteria) | 25 | 15,625 | 9,765,625 |

Which function would accurately model the technician's data?
1) $f(t) = 25^t$
2) $f(t) = 25^{t+1}$
3) $f(t) = 25t$
4) $f(t) = 25(t+1)$

395 Which representations are functions?

| x | y |
|---|---|
| 2 | 6 |
| 3 | -12 |
| 4 | 7 |
| 5 | 5 |
| 2 | -6 |

III
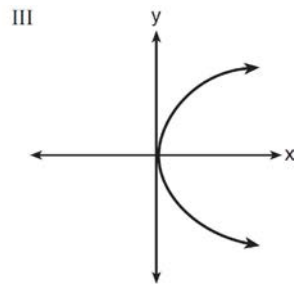
II $\{(1,1), (2,1), (3,2), (4,3), (5,5), (6,8), (7,13)\}$     IV $y = 2x + 1$

1) I and II
2) II and IV
3) III, only
4) IV, only

396 If the area of a rectangle is expressed as $x^4 - 9y^2$, then the product of the length and the width of the rectangle could be expressed as
1) $(x - 3y)(x + 3y)$
2) $(x^2 - 3y)(x^2 + 3y)$
3) $(x^2 - 3y)(x^2 - 3y)$
4) $(x^4 + y)(x - 9y)$

397 What are the roots of the equation $x^2 + 4x - 16 = 0$?
1) $2 \pm 2\sqrt{5}$
2) $-2 \pm 2\sqrt{5}$
3) $2 \pm 4\sqrt{5}$
4) $-2 \pm 4\sqrt{5}$

398 David wanted to go on an amusement park ride. A sign posted at the entrance read "You must be greater than 42 inches tall and no more than 57 inches tall for this ride." Which inequality would model the height, $x$, required for this amusement park ride?
1) $42 < x \le 57$
2) $42 > x \ge 57$
3) $42 < x$ or $x \le 57$
4) $42 > x$ or $x \ge 57$

399 Given: $L = \sqrt{2}$
$M = 3\sqrt{3}$
$N = \sqrt{16}$
$P = \sqrt{9}$
Which expression results in a rational number?
1) $L + M$
2) $M + N$
3) $N + P$
4) $P + L$

400  A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?



1)



2)



3)



4)
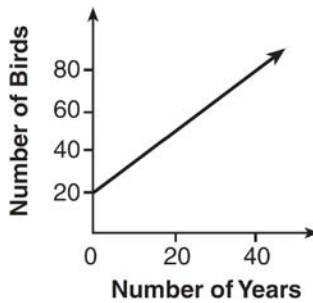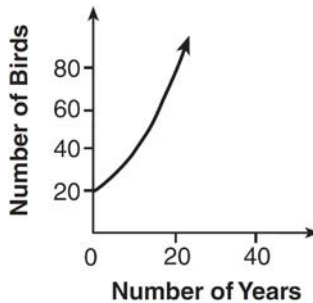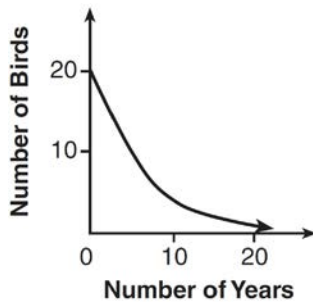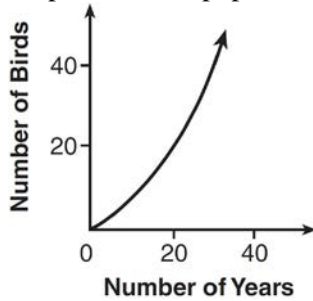
401  An astronaut drops a rock off the edge of a cliff on the Moon. The distance, $d(t)$, in meters, the rock travels after $t$ seconds can be modeled by the function $d(t) = 0.8t^2$. What is the average speed, in meters per second, of the rock between 5 and 10 seconds after it was dropped?
1)  12
2)  20
3)  60
4)  80

402  A student is asked to solve the equation $4(3x - 1)^2 - 17 = 83$. The student's solution to the problem starts as $4(3x - 1)^2 = 100$

$$(3x - 1)^2 = 25$$

A correct next step in the solution of the problem is
1)  $3x - 1 = \pm 5$
2)  $3x - 1 = \pm 25$
3)  $9x^2 - 1 = 25$
4)  $9x^2 - 6x + 1 = 5$

403  In 2013, the United States Postal Service charged $0.46 to mail a letter weighing up to 1 oz. and $0.20 per ounce for each additional ounce. Which function would determine the cost, in dollars, $c(z)$, of mailing a letter weighing $z$ ounces where $z$ is an integer greater than 1?
1)  $c(z) = 0.46z + 0.20$
2)  $c(z) = 0.20z + 0.46$
3)  $c(z) = 0.46(z - 1) + 0.20$
4)  $c(z) = 0.20(z - 1) + 0.46$

404 A pattern of blocks is shown below.



Term 1   Term 2   Term 3   Term 4
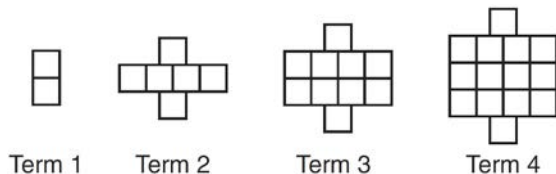
If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the $n$th term?

| I | II | III |
|---|---|---|
| $a_n = n + 4$ | $a_1 = 2$ <br> $a_n = a_{n-1} + 4$ | $a_n = 4n - 2$ |

1) I and II
2) I and III
3) II and III
4) III, only

405 The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where $a$ is acceleration due to gravity and $t$ is the amount of time the object has fallen. What is $t$ in terms of $a$ and $d$?

1) $t = \sqrt{\dfrac{da}{2}}$

2) $t = \sqrt{\dfrac{2d}{a}}$

3) $t = \left(\dfrac{da}{d}\right)^2$

4) $t = \left(\dfrac{2d}{a}\right)^2$

406 If $f(1) = 3$ and $f(n) = -2f(n-1) + 1$, then $f(5) =$
1) $-5$
2) 11
3) 21
4) 43

407 Keith determines the zeros of the function $f(x)$ to be $-6$ and 5. What could be Keith's function?
1) $f(x) = (x+5)(x+6)$
2) $f(x) = (x+5)(x-6)$
3) $f(x) = (x-5)(x+6)$
4) $f(x) = (x-5)(x-6)$

408 To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is $3.00 and the cost of a student ticket is $1.50. If the number of adult tickets sold is represented by $a$ and student tickets sold by $s$, which expression represents the amount of money collected at the door from the ticket sales?
1) $4.50as$
2) $4.50(a+s)$
3) $(3.00a)(1.50s)$
4) $3.00a + 1.50s$

409 What is the correlation coefficient of the linear fit of the data shown below, to the *nearest hundredth*?
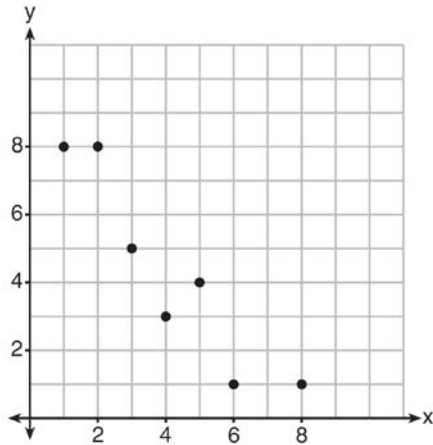


1) 1.00
2) 0.93
3) −0.93
4) −1.00

410 The value in dollars, $v(x)$, of a certain car after $x$ years is represented by the equation $v(x) = 25,000(0.86)^x$. To the *nearest dollar*, how much more is the car worth after 2 years than after 3 years?

1) 2589
2) 6510
3) 15,901
4) 18,490

411 Which equation(s) represent the graph below?

| I | $y = (x + 2)(x^2 - 4x - 12)$ |
| II | $y = (x - 3)(x^2 + x - 2)$ |
| III | $y = (x - 1)(x^2 - 5x - 6)$ |
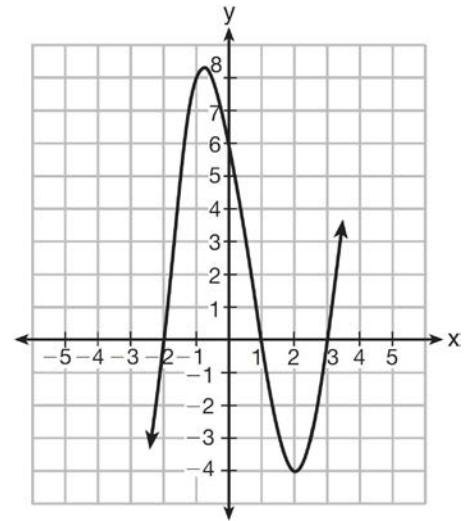


1) I, only
2) II, only
3) I and II
4) II and III

412 When directed to solve a quadratic equation by completing the square, Sam arrived at the equation $\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$. Which equation could have been the original equation given to Sam?

1) $x^2 + 5x + 7 = 0$
2) $x^2 + 5x + 3 = 0$
3) $x^2 - 5x + 7 = 0$
4) $x^2 - 5x + 3 = 0$

413 The diagrams below represent the first three terms of a sequence.



Term 1          Term 2          Term 3
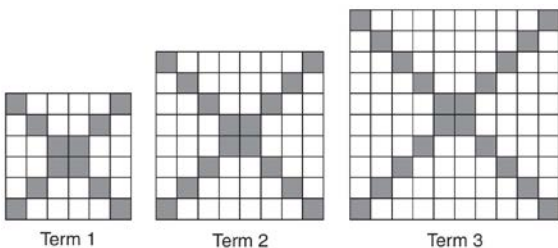
Assuming the pattern continues, which formula determines $a_n$, the number of shaded squares in the $n$th term?
1) $a_n = 4n + 12$
2) $a_n = 4n + 8$
3) $a_n = 4n + 4$
4) $a_n = 4n + 2$

414 The zeros of the function $f(x) = (x+2)^2 - 25$ are
1) $-2$ and 5
2) $-3$ and 7
3) $-5$ and 2
4) $-7$ and 3

415 The cost of a pack of chewing gum in a vending machine is $0.75. The cost of a bottle of juice in the same machine is $1.25. Julia has $22.00 to spend on chewing gum and bottles of juice for her team and she must buy seven packs of chewing gum. If $b$ represents the number of bottles of juice, which inequality represents the maximum number of bottles she can buy?
1) $0.75b + 1.25(7) \geq 22$
2) $0.75b + 1.25(7) \leq 22$
3) $0.75(7) + 1.25b \geq 22$
4) $0.75(7) + 1.25b \leq 22$

416 The value of the $x$-intercept for the graph of $4x - 5y = 40$ is
1) 10
2) $\dfrac{4}{5}$
3) $-\dfrac{4}{5}$
4) $-8$

417 Alicia has invented a new app for smart phones that two companies are interested in purchasing for a 2-year contract. Company $A$ is offering her $10,000 for the first month and will increase the amount each month by $5000. Company $B$ is offering $500 for the first month and will double their payment each month from the previous month. Monthly payments are made at the end of each month. For which monthly payment will company $B$'s payment first exceed company $A$'s payment?
1) 6
2) 7
3) 8
4) 9

418 The equation for the volume of a cylinder is $V = \pi r^2 h$. The positive value of $r$, in terms of $h$ and $V$, is
1) $r = \sqrt{\dfrac{V}{\pi h}}$
2) $r = \sqrt{V \pi h}$
3) $r = 2V\pi h$
4) $r = \dfrac{V}{2\pi}$

419 The table below represents the function $F$.

| $x$ | 3 | 4 | 6 | 7 | 8 |
|---|---|---|---|---|---|
| $F(x)$ | 9 | 17 | 65 | 129 | 257 |

The equation that represents this function is
1) $F(x) = 3^x$
2) $F(x) = 3x$
3) $F(x) = 2^x + 1$
4) $F(x) = 2x + 3$

420 How does the graph of $f(x) = 3(x-2)^2 + 1$ compare to the graph of $g(x) = x^2$?
1) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
2) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.
3) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
4) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

421 The inequality $7 - \dfrac{2}{3}x < x - 8$ is equivalent to
1) $x > 9$
2) $x > -\dfrac{3}{5}$
3) $x < 9$
4) $x < -\dfrac{3}{5}$

422 A sunflower is 3 inches tall at week 0 and grows 2 inches each week. Which function(s) shown below can be used to determine the height, $f(n)$, of the sunflower in $n$ weeks?
  I. $f(n) = 2n + 3$
  II. $f(n) = 2n + 3(n-1)$
  III. $f(n) = f(n-1) + 2$ where $f(0) = 3$
1) I and II
2) II, only
3) III, only
4) I and III

423 Which table represents a function?

1)

| x | 2 | 4 | 2 | 4 |
|---|---|---|---|---|
| f(x) | 3 | 5 | 7 | 9 |

2)

| x | 0 | −1 | 0 | 1 |
|---|---|---|---|---|
| f(x) | 0 | 1 | −1 | 0 |

3)

| x | 3 | 5 | 7 | 9 |
|---|---|---|---|---|
| f(x) | 2 | 4 | 2 | 4 |

4)

| x | 0 | 1 | −1 | 0 |
|---|---|---|---|---|
| f(x) | 0 | −1 | 0 | 1 |

424 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?
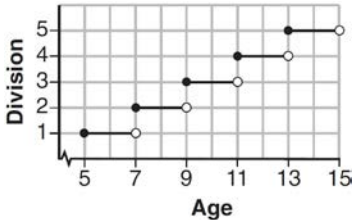
1)
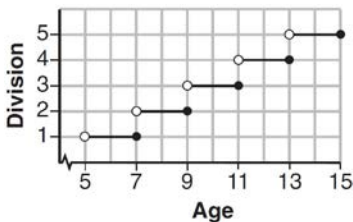
2)
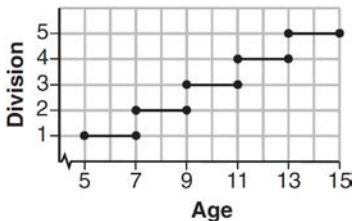
3)
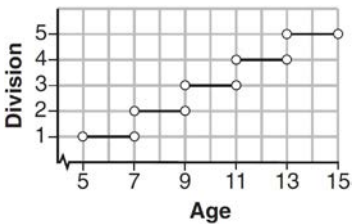
4)

425 Which expression is equivalent to $x^4 - 12x^2 + 36$?
1) $(x^2 - 6)(x^2 - 6)$
2) $(x^2 + 6)(x^2 + 6)$
3) $(6 - x^2)(6 + x^2)$
4) $(x^2 + 6)(x^2 - 6)$

426 Which function has the same $y$-intercept as the graph below?
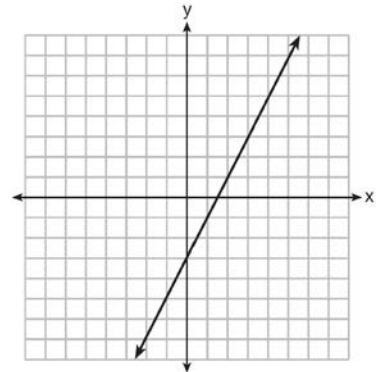
1) $y = \dfrac{12 - 6x}{4}$
2) $27 + 3y = 6x$
3) $6y + x = 18$
4) $y + 3 = 6x$

427 The function $V(t) = 1350(1.017)^t$ represents the value $V(t)$, in dollars, of a comic book $t$ years after its purchase. The yearly rate of appreciation of the comic book is
1) 17%
2) 1.7%
3) 1.017%
4) 0.017%

428 If $4x^2 - 100 = 0$, the roots of the equation are
1) −25 and 25
2) −25, only
3) −5 and 5
4) −5, only

80

429 Which table of values represents a linear relationship?

1)

| x | f(x) |
|---|------|
| −1 | −3 |
| 0 | −2 |
| 1 | 1 |
| 2 | 6 |
| 3 | 13 |

2)

| x | f(x) |
|---|------|
| −1 | $\frac{1}{2}$ |
| 0 | 1 |
| 1 | 2 |
| 2 | 4 |
| 3 | 8 |

3)

| x | f(x) |
|---|------|
| −1 | −3 |
| 0 | −1 |
| 1 | 1 |
| 2 | 3 |
| 3 | 5 |

4)

| x | f(x) |
|---|------|
| −1 | −1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 8 |
| 3 | 27 |

430 If $f(x) = \frac{\sqrt{2x+3}}{6x-5}$, then $f\left(\frac{1}{2}\right) =$

1) 1
2) −2
3) −1
4) $-\frac{13}{3}$

431 Which statement is *not* always true?
1) The sum of two rational numbers is rational.
2) The product of two irrational numbers is rational.
3) The sum of a rational number and an irrational number is irrational.
4) The product of a nonzero rational number and an irrational number is irrational.

432 John has four more nickels than dimes in his pocket, for a total of $1.25. Which equation could be used to determine the number of dimes, *x*, in his pocket?
1) $0.10(x+4) + 0.05(x) = \$1.25$
2) $0.05(x+4) + 0.10(x) = \$1.25$
3) $0.10(4x) + 0.05(x) = \$1.25$
4) $0.05(4x) + 0.10(x) = \$1.25$

433 Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, *y*, of one account that was left inactive for a period of *x* years. What is the *y*-intercept of this equation and what does it represent?
1) 0.98, the percent of money in the account initially
2) 0.98, the percent of money in the account after *x* years
3) 5000, the amount of money in the account initially
4) 5000, the amount of money in the account after *x* years

434 Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy's age, $j$, if he is the younger man?

1) $j^2 + 2 = 783$

2) $j^2 - 2 = 783$

3) $j^2 + 2j = 783$

4) $j^2 - 2j = 783$

435 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

$$\frac{40 \text{ yd}}{4.5 \text{ sec}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$$

Which ratio is *incorrectly* written to convert his speed?

1) $\dfrac{3 \text{ ft}}{1 \text{ yd}}$

2) $\dfrac{5280 \text{ ft}}{1 \text{ mi}}$

3) $\dfrac{60 \text{ sec}}{1 \text{ min}}$

4) $\dfrac{60 \text{ min}}{1 \text{ hr}}$

436 Let $f$ be a function such that $f(x) = 2x - 4$ is defined on the domain $2 \le x \le 6$. The range of this function is

1) $0 \le y \le 8$

2) $0 \le y < \infty$

3) $2 \le y \le 6$

4) $-\infty < y < \infty$

437 If the quadratic formula is used to find the roots of the equation $x^2 - 6x - 19 = 0$, the correct roots are

1) $3 \pm 2\sqrt{7}$

2) $-3 \pm 2\sqrt{7}$

3) $3 \pm 4\sqrt{14}$

4) $-3 \pm 4\sqrt{14}$

438 Which graph shows a line where each value of $y$ is three more than half of $x$?



1)



2)



3)



4)

82
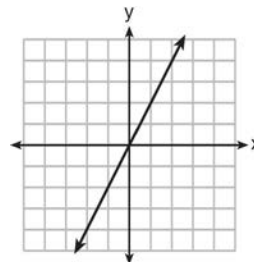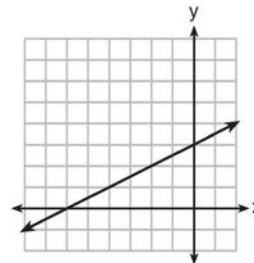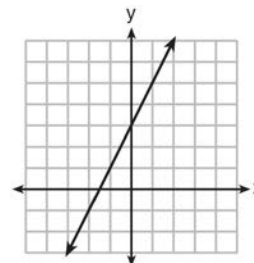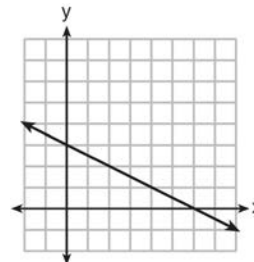
439 A cell phone company charges $60.00 a month for up to 1 gigabyte of data. The cost of additional data is $0.05 per megabyte. If $d$ represents the number of additional megabytes used and $c$ represents the total charges at the end of the month, which linear equation can be used to determine a user's monthly bill?
1) $c = 60 - 0.05d$
2) $c = 60.05d$
3) $c = 60d - 0.05$
4) $c = 60 + 0.05d$

440 The graph of the function $f(x) = \sqrt{x+4}$ is shown below.
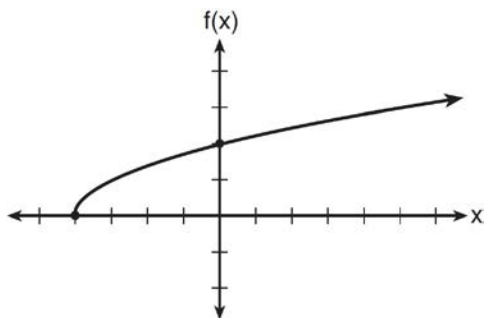


The domain of the function is
1) $\{x \mid x > 0\}$
2) $\{x \mid x \geq 0\}$
3) $\{x \mid x > -4\}$
4) $\{x \mid x \geq -4\}$

441 For which function defined by a polynomial are the zeros of the polynomial −4 and −6?
1) $y = x^2 - 10x - 24$
2) $y = x^2 + 10x + 24$
3) $y = x^2 + 10x - 24$
4) $y = x^2 - 10x + 24$

442 Which recursively defined function has a first term equal to 10 and a common difference of 4?
1) $f(1) = 10$

$f(x) = f(x-1) + 4$
2) $f(1) = 4$

$f(x) = f(x-1) + 10$
3) $f(1) = 10$

$f(x) = 4f(x-1)$
4) $f(1) = 4$

$f(x) = 10f(x-1)$

443 The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?
1) $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$
2) $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$
3) $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$
4) $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

444 A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of $62 and an overage charge of $30 per gigabyte of data that exceed 2 gigabytes. If $C$ represents the cost and $g$ represents the total number of gigabytes of data, which equation could represent this plan when more than 2 gigabytes are used?
1) $C = 30 + 62(2 - g)$
2) $C = 30 + 62(g - 2)$
3) $C = 62 + 30(2 - g)$
4) $C = 62 + 30(g - 2)$

445 The graph of the equation $y = ax^2$ is shown below.
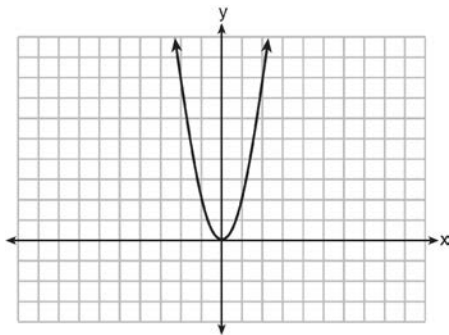


If $a$ is multiplied by $-\dfrac{1}{2}$, the graph of the new equation is
1) wider and opens downward
2) wider and opens upward
3) narrower and opens downward
4) narrower and opens upward

446 The graph of $y = f(x)$ is shown below.
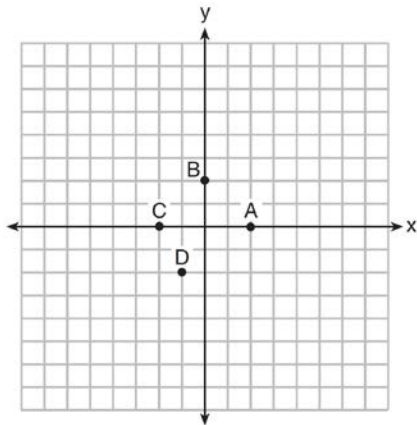


Which point could be used to find $f(2)$?
1) A
2) B
3) C
4) D

447 Which value of $x$ satisfies the equation
$$\frac{7}{3}\left(x + \frac{9}{28}\right) = 20?$$
1) 8.25
2) 8.89
3) 19.25
4) 44.92

448 A company produces $x$ units of a product per month, where $C(x)$ represents the total cost and $R(x)$ represents the total revenue for the month. The functions are modeled by $C(x) = 300x + 250$ and $R(x) = -0.5x^2 + 800x - 100$. The profit is the difference between revenue and cost where $P(x) = R(x) - C(x)$. What is the total profit, $P(x)$, for the month?
1) $P(x) = -0.5x^2 + 500x - 150$
2) $P(x) = -0.5x^2 + 500x - 350$
3) $P(x) = -0.5x^2 - 500x + 350$
4) $P(x) = -0.5x^2 + 500x + 350$

449 Connor wants to attend the town carnival. The price of admission to the carnival is $4.50, and each ride costs an additional 79 cents. If he can spend at most $16.00 at the carnival, which inequality can be used to solve for $r$, the number of rides Connor can go on, and what is the maximum number of rides he can go on?
1) $0.79 + 4.50r \le 16.00$; 3 rides
2) $0.79 + 4.50r \le 16.00$; 4 rides
3) $4.50 + 0.79r \le 16.00$; 14 rides
4) $4.50 + 0.79r \le 16.00$; 15 rides

84

450 The table below shows the annual salaries for the 24 members of a professional sports team in terms of millions of dollars.

| 0.5 | 0.5 | 0.6 | 0.7 | 0.75 | 0.8 |
|-----|-----|-----|------|------|-----|
| 1.0 | 1.0 | 1.1 | 1.25 | 1.3  | 1.4 |
| 1.4 | 1.8 | 2.5 | 3.7  | 3.8  | 4   |
| 4.2 | 4.6 | 5.1 | 6    | 6.3  | 7.2 |

The team signs an additional player to a contract worth 10 million dollars per year. Which statement about the median and mean is true?
1) Both will increase.
2) Only the median will increase.
3) Only the mean will increase.
4) Neither will change.

451 A function is graphed on the set of axes below.
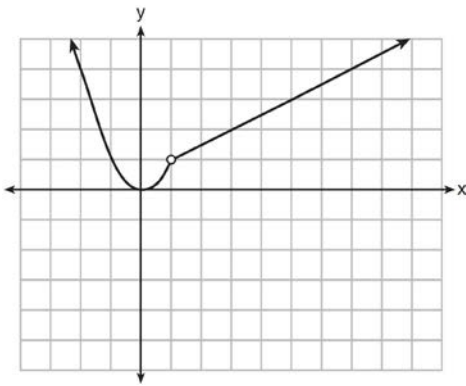


Which function is related to the graph?

1) $f(x) = \begin{cases} x^2, & x < 1 \\ x - 2, & x > 1 \end{cases}$

2) $f(x) = \begin{cases} x^2, & x < 1 \\ \dfrac{1}{2}x + \dfrac{1}{2}, & x > 1 \end{cases}$

3) $f(x) = \begin{cases} x^2, & x < 1 \\ 2x - 7, & x > 1 \end{cases}$

4) $f(x) = \begin{cases} x^2, & x < 1 \\ \dfrac{3}{2}x - \dfrac{9}{2}, & x > 1 \end{cases}$

452 Last week, a candle store received $355.60 for selling 20 candles. Small candles sell for $10.98 and large candles sell for $27.98. How many large candles did the store sell?
1) 6
2) 8
3) 10
4) 12

453 A polynomial function contains the factors $x$, $x - 2$, and $x + 5$. Which graph(s) below could represent the graph of this function?
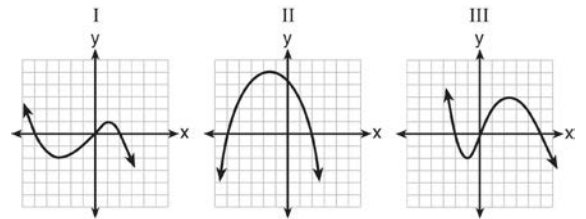


1) I, only
2) II, only
3) I and III
4) I, II, and III

454 Christopher looked at his quiz scores shown below for the first and second semester of his Algebra class.

Semester 1: 78, 91, 88, 83, 94

Semester 2: 91, 96, 80, 77, 88, 85, 92

Which statement about Christopher's performance is correct?
1) The interquartile range for semester 1 is greater than the interquartile range for semester 2.
2) The median score for semester 1 is greater than the median score for semester 2.
3) The mean score for semester 2 is greater than the mean score for semester 1.
4) The third quartile for semester 2 is greater than the third quartile for semester 1.

455 Given the graph of the line represented by the equation $f(x) = -2x + b$, if $b$ is increased by 4 units, the graph of the new line would be shifted 4 units
1) right
2) up
3) left
4) down

456 Rowan has $50 in a savings jar and is putting in $5 every week. Jonah has $10 in his own jar and is putting in $15 every week. Each of them plots his progress on a graph with time on the horizontal axis and amount in the jar on the vertical axis. Which statement about their graphs is true?
1) Rowan's graph has a steeper slope than Jonah's.
2) Rowan's graph always lies above Jonah's.
3) Jonah's graph has a steeper slope than Rowan's.
4) Jonah's graph always lies above Rowan's.

457 Which graph represents $f(x) = \begin{cases} |x| & x < 1 \\ \sqrt{x} & x \geq 1 \end{cases}$ ?

1)

2)

3)

4)
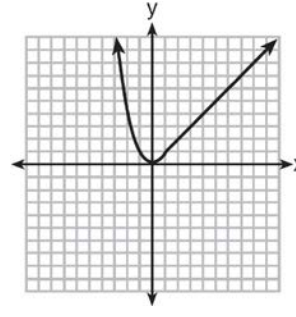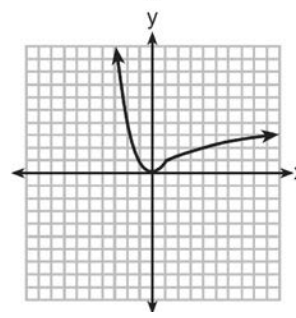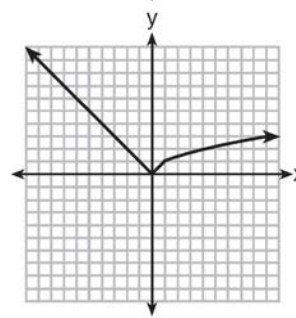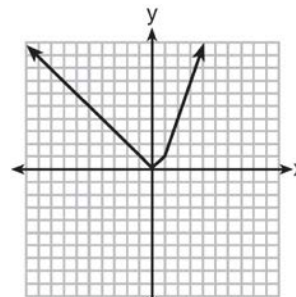
458 What are the solutions to the equation
$x^2 - 8x = 24$?

1) $x = 4 \pm 2\sqrt{10}$

2) $x = -4 \pm 2\sqrt{10}$

3) $x = 4 \pm 2\sqrt{2}$

4) $x = -4 \pm 2\sqrt{2}$

459 The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.
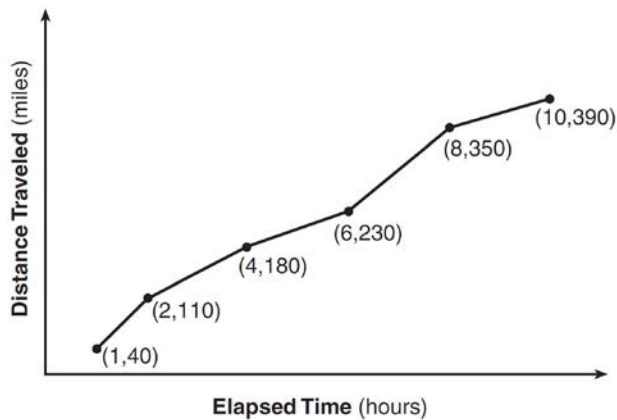


During which interval was their average speed the greatest?

1) the first hour to the second hour
2) the second hour to the fourth hour
3) the sixth hour to the eighth hour
4) the eighth hour to the tenth hour

460 Which equation has the same solution as
$x^2 - 6x - 12 = 0$?

1) $(x + 3)^2 = 21$

2) $(x - 3)^2 = 21$

3) $(x + 3)^2 = 3$

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

461 The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and −3?



1)



2)



3)



4)

87
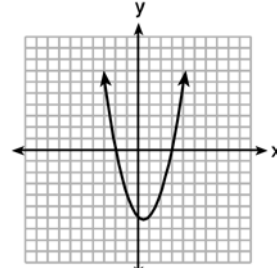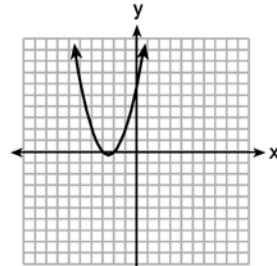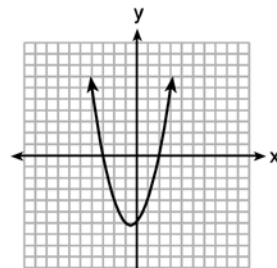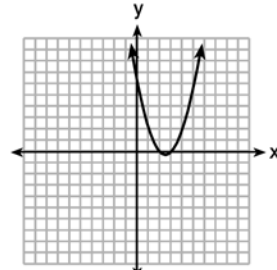
462  For which value of $P$ and $W$ is $P + W$ a rational number?

1)  $P = \dfrac{1}{\sqrt{3}}$ and $W = \dfrac{1}{\sqrt{6}}$

2)  $P = \dfrac{1}{\sqrt{4}}$ and $W = \dfrac{1}{\sqrt{9}}$

3)  $P = \dfrac{1}{\sqrt{6}}$ and $W = \dfrac{1}{\sqrt{10}}$

4)  $P = \dfrac{1}{\sqrt{25}}$ and $W = \dfrac{1}{\sqrt{2}}$

463  Two functions, $y = |x - 3|$ and $3x + 3y = 27$, are graphed on the same set of axes.  Which statement is true about the solution to the system of equations?

1)  $(3,0)$ is the solution to the system because it satisfies the equation $y = |x - 3|$.
2)  $(9,0)$ is the solution to the system because it satisfies the equation $3x + 3y = 27$.
3)  $(6,3)$ is the solution to the system because it satisfies both equations.
4)  $(3,0)$, $(9,0)$, and $(6,3)$ are the solutions to the system of equations because they all satisfy at least one of the equations.

464  The length of the shortest side of a right triangle is 8 inches.  The lengths of the other two sides are represented by consecutive odd integers.  Which equation could be used to find the lengths of the other sides of the triangle?

1)  $8^2 + (x + 1) = x^2$
2)  $x^2 + 8^2 = (x + 1)^2$
3)  $8^2 + (x + 2) = x^2$
4)  $x^2 + 8^2 = (x + 2)^2$

465  A satellite television company charges a one-time installation fee and a monthly service charge.  The total cost is modeled by the function $y = 40 + 90x$.  Which statement represents the meaning of each part of the function?

1)  $y$ is the total cost, $x$ is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.
2)  $y$ is the total cost, $x$ is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
3)  $x$ is the total cost, $y$ is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
4)  $x$ is the total cost, $y$ is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.

466  The formula for the volume of a cone is $V = \dfrac{1}{3}\pi r^2 h$.  The radius, $r$, of the cone may be expressed as

1)  $\sqrt{\dfrac{3V}{\pi h}}$

2)  $\sqrt{\dfrac{V}{3\pi h}}$

3)  $3\sqrt{\dfrac{V}{\pi h}}$

4)  $\dfrac{1}{3}\sqrt{\dfrac{V}{\pi h}}$

467  If $A = 3x^2 + 5x - 6$ and $B = -2x^2 - 6x + 7$, then $A - B$ equals

1)  $-5x^2 - 11x + 13$
2)  $5x^2 + 11x - 13$
3)  $-5x^2 - x + 1$
4)  $5x^2 - x + 1$

468 Which statistic would indicate that a linear function would *not* be a good fit to model a data set?
1) $r = -0.93$
2) $r = 1$
3)

Residual



4)

Residual
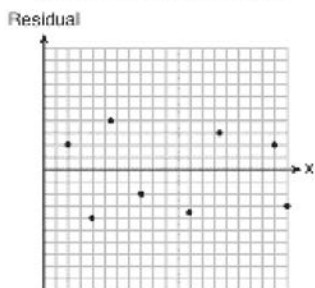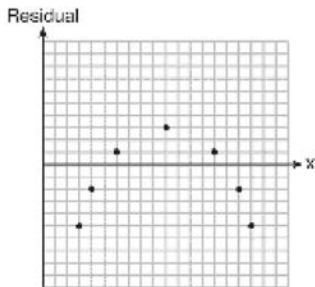


469 Which situation could be modeled by using a linear function?
1) a bank account balance that grows at a rate of 5% per year, compounded annually
2) a population of bacteria that doubles every 4.5 hours
3) the cost of cell phone service that charges a base amount plus 20 cents per minute
4) the concentration of medicine in a person's body that decays by a factor of one-third every hour

470 Which ordered pair is *not* in the solution set of $y > -\dfrac{1}{2}x + 5$ and $y \le 3x - 2$?
1) $(5,3)$
2) $(4,3)$
3) $(3,4)$
4) $(4,4)$

471 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200°F.
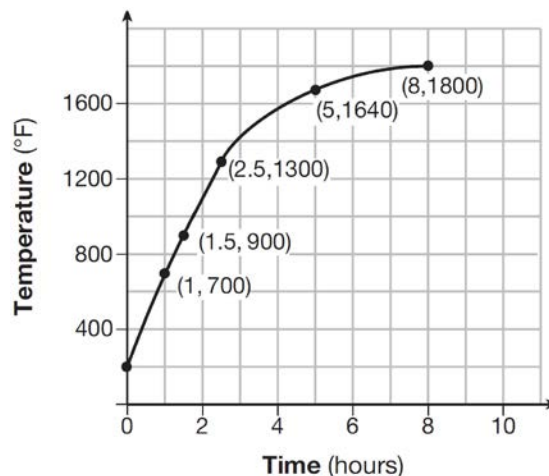


During which time interval did the temperature in the kiln show the greatest average rate of change?
1) 0 to 1 hour
2) 1 hour to 1.5 hours
3) 2.5 hours to 5 hours
4) 5 hours to 8 hours

472 Which point is *not* on the graph represented by $y = x^2 + 3x - 6$?
1) $(-6,12)$
2) $(-4,-2)$
3) $(2,4)$
4) $(3,-6)$

473 If $f(x) = x^2 - 2x - 8$ and $g(x) = \dfrac{1}{4}x - 1$, for which values of $x$ is $f(x) = g(x)$?
1) $-1.75$ and $-1.438$
2) $-1.75$ and $4$
3) $-1.438$ and $0$
4) $4$ and $0$

89

474 What is one point that lies in the solution set of the system of inequalities graphed below?
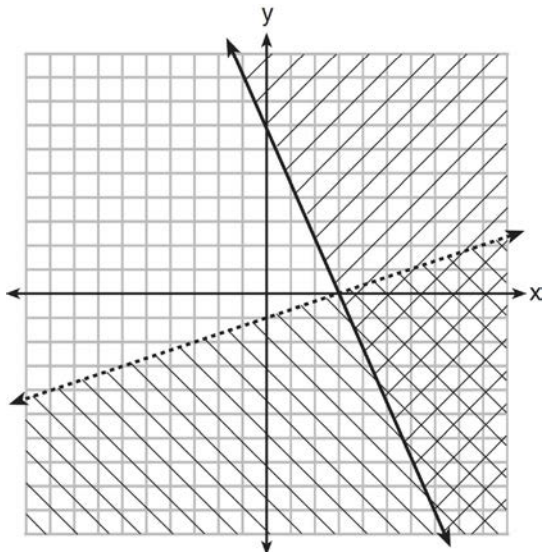


1) (7,0)
2) (3,0)
3) (0,7)
4) (−3,5)

475 When factored completely, the expression $p^4 - 81$ is equivalent to
1) $(p^2 + 9)(p^2 - 9)$
2) $(p^2 - 9)(p^2 - 9)$
3) $(p^2 + 9)(p + 3)(p - 3)$
4) $(p + 3)(p - 3)(p + 3)(p - 3)$

476 If a sequence is defined recursively by $f(0) = 2$ and $f(n + 1) = -2f(n) + 3$ for $n \geq 0$, then $f(2)$ is equal to
1) 1
2) −11
3) 5
4) 17

477 Which domain would be the most appropriate set to use for a function that predicts the number of household online-devices in terms of the number of people in the household?
1) integers
2) whole numbers
3) irrational numbers
4) rational numbers

478 The graph of $f(x)$ is shown below.
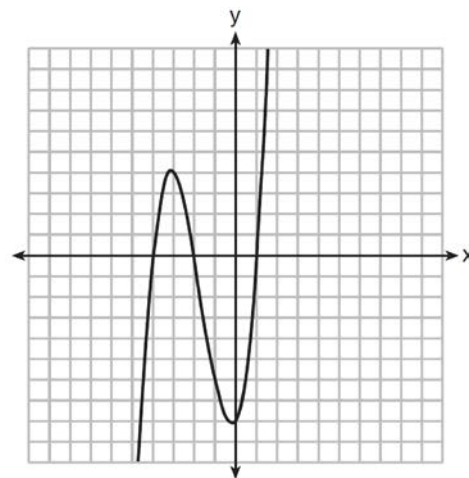


Which function could represent the graph of $f(x)$?
1) $f(x) = (x + 2)(x^2 + 3x - 4)$
2) $f(x) = (x - 2)(x^2 + 3x - 4)$
3) $f(x) = (x + 2)(x^2 + 3x + 4)$
4) $f(x) = (x - 2)(x^2 + 3x + 4)$

479 The zeros of the function $f(x) = 3x^2 - 3x - 6$ are
1) −1 and −2
2) 1 and −2
3) 1 and 2
4) −1 and 2

90

480 Which graph represents the solution of $y \leq x + 3$ and $y \geq -2x - 2$?

1)

2)

3)

4)

482 The graph below represents a jogger's speed during her 20-minute jog around her neighborhood.

Which statement best describes what the jogger was doing during the $9 - 12$ minute interval of her jog?
1) She was standing still.
2) She was increasing her speed.
3) She was decreasing her speed.
4) She was jogging at a constant rate.

483 The function $h(t) = -16t^2 + 144$ represents the height, $h(t)$, in feet, of an object from the ground at $t$ seconds after it is dropped. A realistic domain for this function is
1) $-3 \leq t \leq 3$
2) $0 \leq t \leq 3$
3) $0 \leq h(t) \leq 144$
4) all real numbers

481 Officials in a town use a function, $C$, to analyze traffic patterns. $C(n)$ represents the rate of traffic through an intersection where $n$ is the number of observed vehicles in a specified time interval. What would be the most appropriate domain for the function?
1) $\{\ldots -2, -1, 0, 1, 2, 3, \ldots\}$
2) $\{-2, -1, 0, 1, 2, 3\}$
3) $\{0, \frac{1}{2}, 1, 1\frac{1}{2}, 2, 2\frac{1}{2}\}$
4) $\{0, 1, 2, 3, \ldots\}$

484 Which trinomial is equivalent to $3(x - 2)^2 - 2(x - 1)$?
1) $3x^2 - 2x - 10$
2) $3x^2 - 2x - 14$
3) $3x^2 - 14x + 10$
4) $3x^2 - 14x + 14$

91

485 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

| Enlargement | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| **Area** (square inches) | 15 | 18.8 | 23.4 | 29.3 | 36.6 |

What is the average rate of change of the area from the original photograph to the fourth enlargement, to the *nearest tenth*?
1) 4.3
2) 4.5
3) 5.4
4) 6.0

486 Given: $y + x > 2$

$y \le 3x - 2$

Which graph shows the solution of the given set of inequalities?


1)


2)


3)


4)
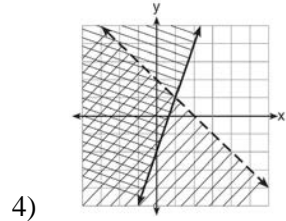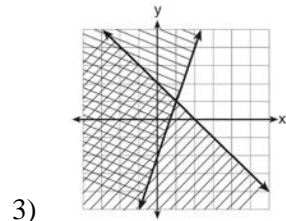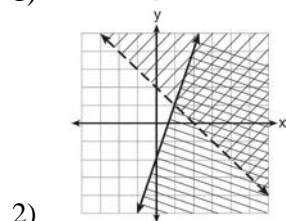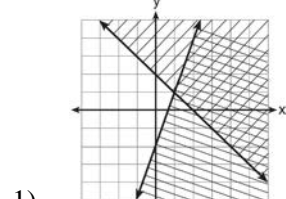
487 A company that manufactures radios first pays a start-up cost, and then spends a certain amount of money to manufacture each radio. If the cost of manufacturing $r$ radios is given by the function $c(r) = 5.25r + 125$, then the value 5.25 best represents
1) the start-up cost
2) the profit earned from the sale of one radio
3) the amount spent to manufacture each radio
4) the average number of radios manufactured

488 If Lylah completes the square for $f(x) = x^2 - 12x + 7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x) = (x - a)^2 + b$. What is the value of $a$ for $f(x)$?
1) 6
2) −6
3) 12
4) −12

489 What are the zeros of the function $f(x) = x^2 - 13x - 30$?
1) −10 and 3
2) 10 and −3
3) −15 and 2
4) 15 and −2

490 Given the following quadratic functions:

$$g(x) = -x^2 - x + 6$$

and

| x | −3 | −2 | −1 | 0 | 1 | 2 | 3 | 4 | 5 |
|------|----|----|----|---|---|---|---|---|----|
| n(x) | −7 | 0 | 5 | 8 | 9 | 8 | 5 | 0 | −7 |

Which statement about these functions is true?
1) Over the interval $-1 \leq x \leq 1$, the average rate of change for $n(x)$ is less than that for $g(x)$.
2) The $y$-intercept of $g(x)$ is greater than the $y$-intercept for $n(x)$.
3) The function $g(x)$ has a greater maximum value than $n(x)$.
4) The sum of the roots of $n(x) = 0$ is greater than the sum of the roots of $g(x) = 0$.

491 Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function $f(t) = n^{2t}$ while Jessica uses the function $g(t) = n^{4t}$, where $n$ represents the initial number of bacteria and $t$ is the time, in hours. If Miriam starts with 16 bacteria, how many bacteria should Jessica start with to achieve the same growth over time?
1) 32
2) 16
3) 8
4) 4

492 Mo's farm stand sold a total of 165 pounds of apples and peaches. She sold apples for $1.75 per pound and peaches for $2.50 per pound. If she made $337.50, how many pounds of peaches did she sell?
1) 11
2) 18
3) 65
4) 100

493 The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is $a_1$, which is an equation for the $n$th term of this sequence?
1) $a_n = 8n + 10$
2) $a_n = 8n - 14$
3) $a_n = 16n + 10$
4) $a_n = 16n - 38$

494 Which equation has the same solutions as $x^2 + 6x - 7 = 0$?
1) $(x + 3)^2 = 2$
2) $(x - 3)^2 = 2$
3) $(x - 3)^2 = 16$
4) $(x + 3)^2 = 16$

495 Which equation has the same solutions as $2x^2 + x - 3 = 0$
1) $(2x - 1)(x + 3) = 0$
2) $(2x + 1)(x - 3) = 0$
3) $(2x - 3)(x + 1) = 0$
4) $(2x + 3)(x - 1) = 0$

496  Isaiah collects data from two different companies, each with four employees.  The results of the study, based on each worker's age and salary, are listed in the tables below.

| Company 1 | |
|---|---|
| Worker's Age in Years | Salary in Dollars |
| 25 | 30,000 |
| 27 | 32,000 |
| 28 | 35,000 |
| 33 | 38,000 |

| Company 2 | |
|---|---|
| Worker's Age in Years | Salary in Dollars |
| 25 | 29,000 |
| 28 | 35,500 |
| 29 | 37,000 |
| 31 | 65,000 |

Which statement is true about these data?
1) The median salaries in both companies are greater than $37,000.
2) The mean salary in company 1 is greater than the mean salary in company 2.
3) The salary range in company 2 is greater than the salary range in company 1.
4) The mean age of workers at company 1 is greater than the mean age of workers at company 2.

497  The table below shows the number of grams of carbohydrates, $x$, and the number of Calories, $y$, of six different foods.

| Carbohydrates ($x$) | Calories ($y$) |
|---|---|
| 8 | 120 |
| 9.5 | 138 |
| 10 | 147 |
| 6 | 88 |
| 7 | 108 |
| 4 | 62 |

Which equation best represents the line of best fit for this set of data?
1) $y = 15x$
2) $y = 0.07x$
3) $y = 0.1x - 0.4$
4) $y = 14.1x + 5.8$

498 The table below shows the average diameter of a pupil in a person's eye as he or she grows older.

| Age (years) | Average Pupil Diameter (mm) |
|---|---|
| 20 | 4.7 |
| 30 | 4.3 |
| 40 | 3.9 |
| 50 | 3.5 |
| 60 | 3.1 |
| 70 | 2.7 |
| 80 | 2.3 |

What is the average rate of change, in millimeters per year, of a person's pupil diameter from age 20 to age 80?
1)  2.4
2)  0.04
3)  −2.4
4)  −0.04

499 What is the value of $x$ in the equation
$$\frac{x-2}{3} + \frac{1}{6} = \frac{5}{6}?$$
1)  4
2)  6
3)  8
4)  11

501 The graph of a linear equation contains the points $(3,11)$ and $(-2,1)$. Which point also lies on the graph?
1)  $(2,1)$
2)  $(2,4)$
3)  $(2,6)$
4)  $(2,9)$

500 Krystal was given $3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?
1)  $3000(1 + 0.02)^{16}$
2)  $3000(1 - 0.02)^{16}$
3)  $3000(1 + 0.02)^{18}$
4)  $3000(1 - 0.02)^{18}$

502 Which system of equations has the same solution as the system below?
$$2x + 2y = 16$$
$$3x - y = 4$$
1)  $2x + 2y = 16$
   $6x - 2y = 4$
2)  $2x + 2y = 16$
   $6x - 2y = 8$
3)  $x + y = 16$
   $3x - y = 4$
4)  $6x + 6y = 48$
   $6x + 2y = 8$

503 The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

| Year | Balance, in Dollars |
|------|---------------------|
| 0 | 380.00 |
| 10 | 562.49 |
| 20 | 832.63 |
| 30 | 1232.49 |
| 40 | 1824.39 |
| 50 | 2700.54 |

Which type of function best models the given data?
1) linear function with a negative rate of change
2) linear function with a positive rate of change
3) exponential decay function
4) exponential growth function

504 The two sets of data below represent the number of runs scored by two different youth baseball teams over the course of a season.

Team $A$: 4, 8, 5, 12, 3, 9, 5, 2
Team $B$: 5, 9, 11, 4, 6, 11, 2, 7

Which set of statements about the mean and standard deviation is true?
1) mean $A <$ mean $B$
standard deviation $A >$ standard deviation $B$
2) mean $A >$ mean $B$
standard deviation $A <$ standard deviation $B$
3) mean $A <$ mean $B$
standard deviation $A <$ standard deviation $B$
4) mean $A >$ mean $B$
standard deviation $A >$ standard deviation $B$

505 If $f(x) = \frac{1}{3}x + 9$, which statement is always true?

1) $f(x) < 0$
2) $f(x) > 0$
3) If $x < 0$, then $f(x) < 0$.
4) If $x > 0$, then $f(x) > 0$.

506 Which quadratic function has the largest maximum?
1) $h(x) = (3 - x)(2 + x)$

2)

| x | f(x) |
|----|------|
| −1 | −3 |
| 0 | 5 |
| 1 | 9 |
| 2 | 9 |
| 3 | 5 |
| 4 | −3 |

3) $k(x) = -5x^2 - 12x + 4$

g(x)

4)

96
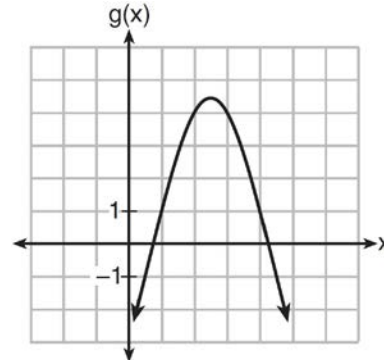
507 Corinne is planning a beach vacation in July and is analyzing the daily high temperatures for her potential destination. She would like to choose a destination with a high median temperature and a small interquartile range. She constructed box plots shown in the diagram below.

Ocean Beach     Serene Shores

Whispering Palms     Pelican Beach

70 75 80 85 90 95 100     70 75 80 85 90 95 100
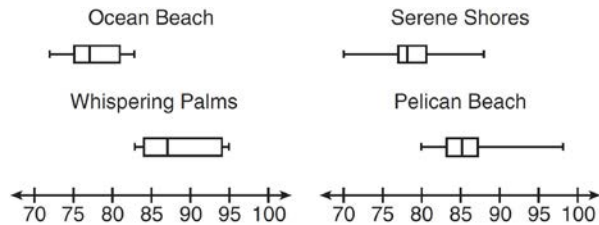
Which destination has a median temperature above 80 degrees and the smallest interquartile range?
1) Ocean Beach
2) Whispering Palms
3) Serene Shores
4) Pelican Beach

508 If $f(x) = 3^x$ and $g(x) = 2x + 5$, at which value of $x$ is $f(x) < g(x)$?
1) −1
2) 2
3) −3
4) 4

509 Which statement is *not* always true?
1) The product of two irrational numbers is irrational.
2) The product of two rational numbers is rational.
3) The sum of two rational numbers is rational.
4) The sum of a rational number and an irrational number is irrational.

510 A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, $y$, of the ball from the ground after $x$ seconds.
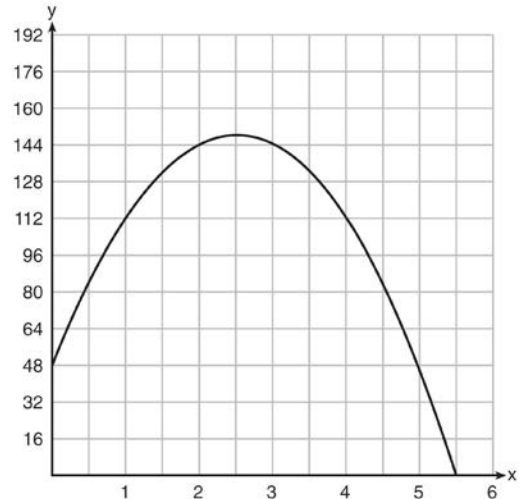
For which interval is the ball's height always *decreasing*?
1) $0 \le x \le 2.5$
2) $0 < x < 5.5$
3) $2.5 < x < 5.5$
4) $x \ge 2$

511 Fred is given a rectangular piece of paper. If the length of Fred's piece of paper is represented by $2x - 6$ and the width is represented by $3x - 5$, then the paper has a total area represented by
1) $5x - 11$
2) $6x^2 - 28x + 30$
3) $10x - 22$
4) $6x^2 - 6x - 11$

## Algebra I 2 Point Regents Exam Questions

512  Emma recently purchased a new car. She decided to keep track of how many gallons of gas she used on five of her business trips. The results are shown in the table below.

| Miles Driven | Number of Gallons Used |
|---|---|
| 150 | 7 |
| 200 | 10 |
| 400 | 19 |
| 600 | 29 |
| 1000 | 51 |

Write the linear regression equation for these data where miles driven is the independent variable. (Round all values to the *nearest hundredth*.)

513  Let $f$ be the function represented by the graph below.
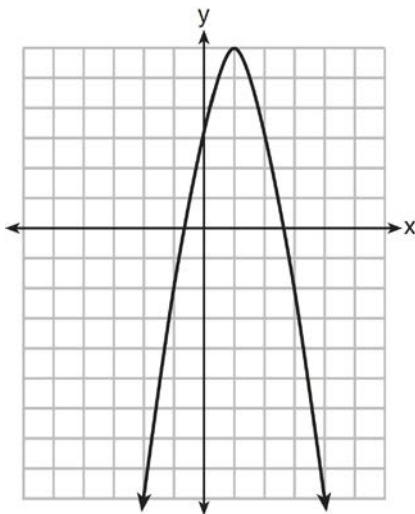


Let $g$ be a function such that $g(x) = -\frac{1}{2}x^2 + 4x + 3$.

Determine which function has the larger maximum value. Justify your answer.

514  Solve algebraically for $y$: $4(y - 3) \le 4(2y + 1)$

515  Solve the inequality below to determine and state the smallest possible value for $x$ in the solution set.
$$3(x + 3) \le 5x - 3$$

516  Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.
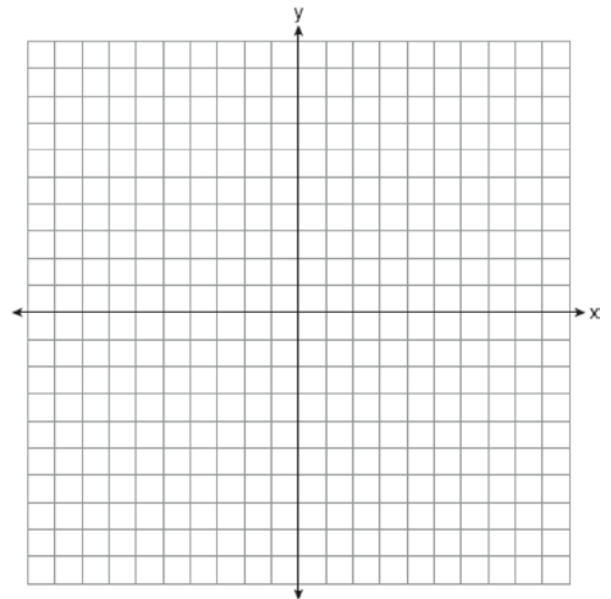
517 Is the product of two irrational numbers always irrational? Justify your answer.

518 The graph of the function $f(x) = ax^2 + bx + c$ is given below.
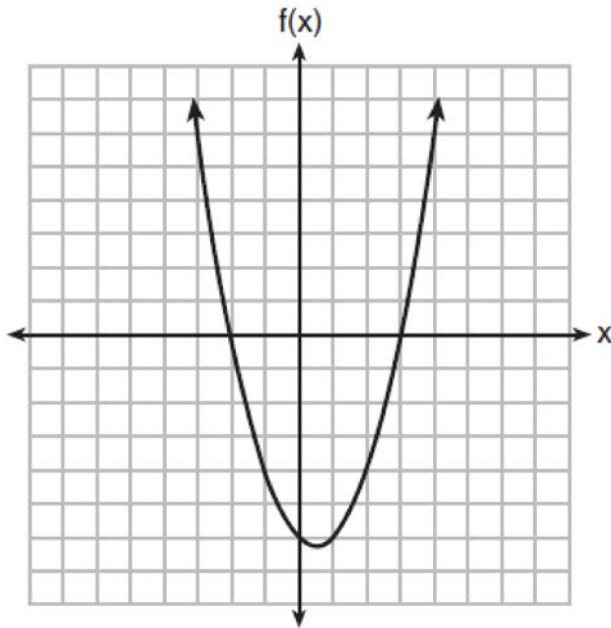


Could the factors of $f(x)$ be $(x+2)$ and $(x-3)$? Based on the graph, explain why or why *not*.

519 A student was given the equation $x^2 + 6x - 13 = 0$ to solve by completing the square. The first step that was written is shown below.

$$x^2 + 6x = 13$$

The next step in the student's process was $x^2 + 6x + c = 13 + c$. State the value of $c$ that creates a perfect square trinomial. Explain how the value of $c$ is determined.

520 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.
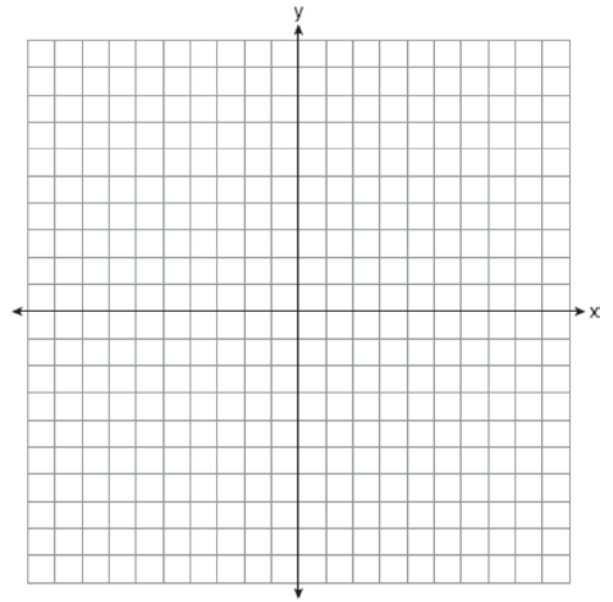


521 On the set of axes below, graph $f(x) = |x-3| + 2$.
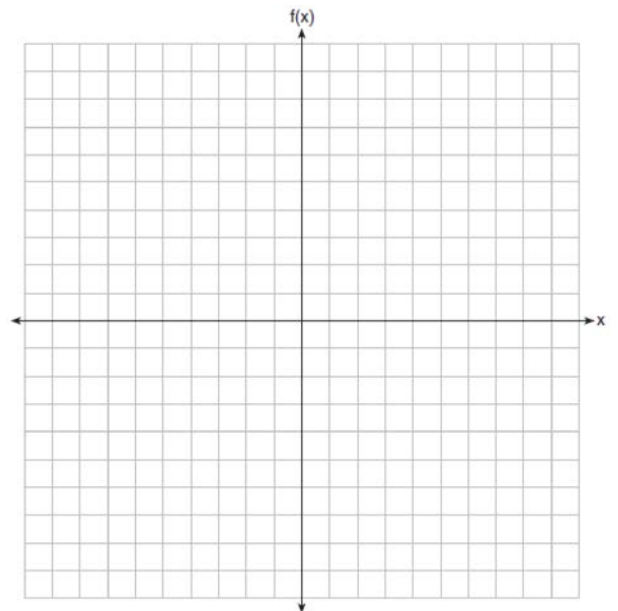
522  A family is traveling from their home to a vacation resort hotel.  The table below shows their distance from home as a function of time.

| Time (hrs) | 0 | 2 | 5 | 7 |
|---|---|---|---|---|
| Distance (mi) | 0 | 140 | 375 | 480 |

Determine the average rate of change between hour 2 and hour 7, including units.

523  On the set of axes below, graph the function represented by $y = \sqrt[3]{x-2}$ for the domain $-6 \le x \le 10$.
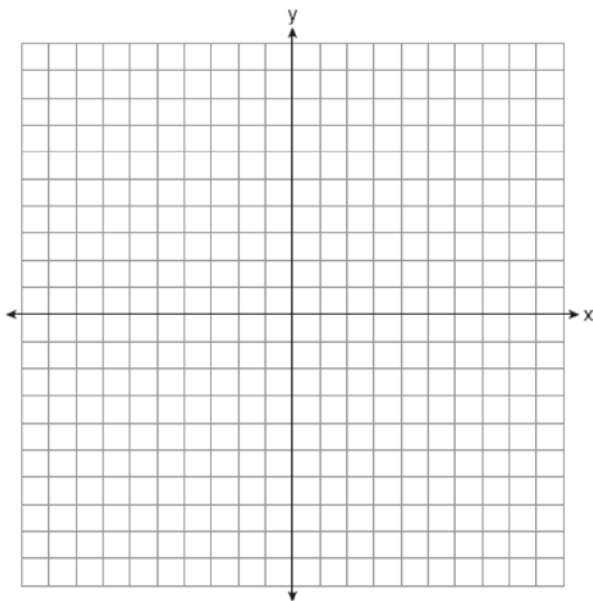


524  The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where $G$ is the gravitational constant, $M_1$ is the mass of one object, $M_2$ is the mass of the other object, and $r$ is the distance between them.  Solve for the positive value of $r$ in terms of $F_g$, $G$, $M_1$, and $M_2$.

525  Express the product of $2x^2 + 7x - 10$ and $x + 5$ in standard form.

526  State whether $7 - \sqrt{2}$ is rational or irrational.  Explain your answer.

527  Jacob and Jessica are studying the spread of dandelions.  Jacob discovers that the growth over $t$ weeks can be defined by the function $f(t) = (8) \cdot 2^t$.  Jessica finds that the growth function over $t$ weeks is $g(t) = 2^{t+3}$.  Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks.  Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

528  Subtract $3x(x - 2y)$ from $6(x^2 - xy)$ and express your answer as a monomial.

529  A gardener is planting two types of trees:
    Type $A$ is three feet tall and grows at a rate of 15 inches per year.
    Type $B$ is four feet tall and grows at a rate of 10 inches per year.
Algebraically determine exactly how many years it will take for these trees to be the same height.

530 On the set of axes below, graph the inequality $2x + y > 1$.
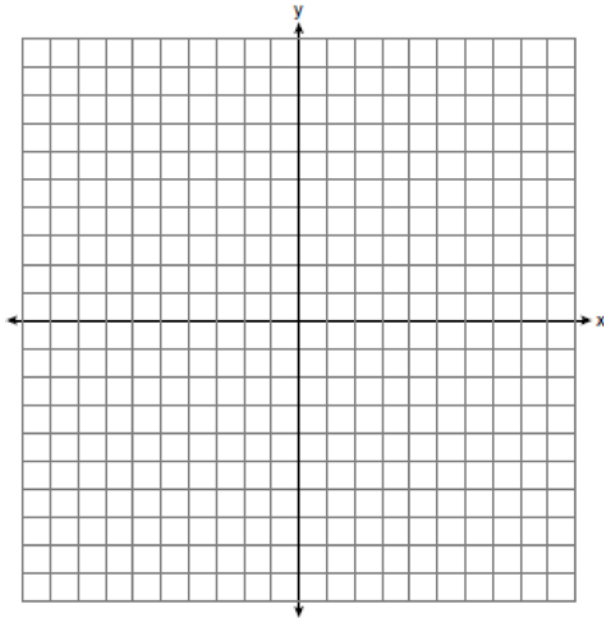


531 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

532 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of $x$ for which $f(x) = g(x)$.
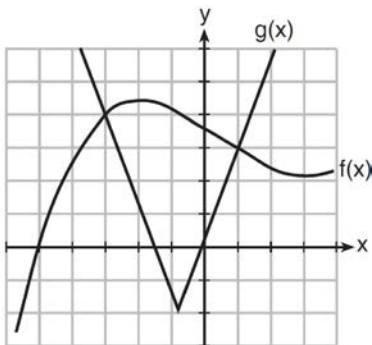


533 Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of $a_2$, $a_3$, and $a_4$ for the given recursive formula.

534 Determine if the point $(0,4)$ is a solution to the system of inequalities graphed below. Justify your answer.



$$y \geq -2x + 4$$
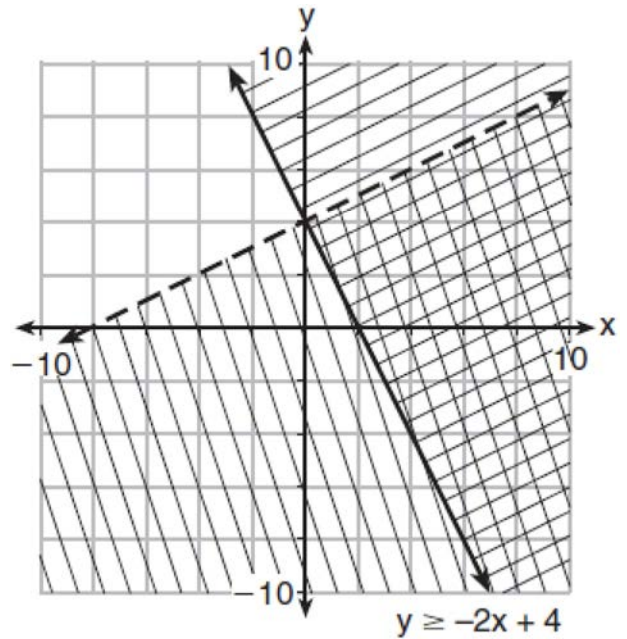
535 Amy solved the equation $2x^2 + 5x - 42 = 0$. She stated that the solutions to the equation were $\frac{7}{2}$ and $-6$. Do you agree with Amy's solutions? Explain why or why not.

536 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

| Number of Hours, x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of Bacteria, B(x) | 220 | 280 | 350 | 440 | 550 | 690 | 860 | 1070 | 1340 | 1680 |

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

537 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and $t$ represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

538 Graph the inequality $y + 4 < -2(x - 4)$ on the set of axes below.



539 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.
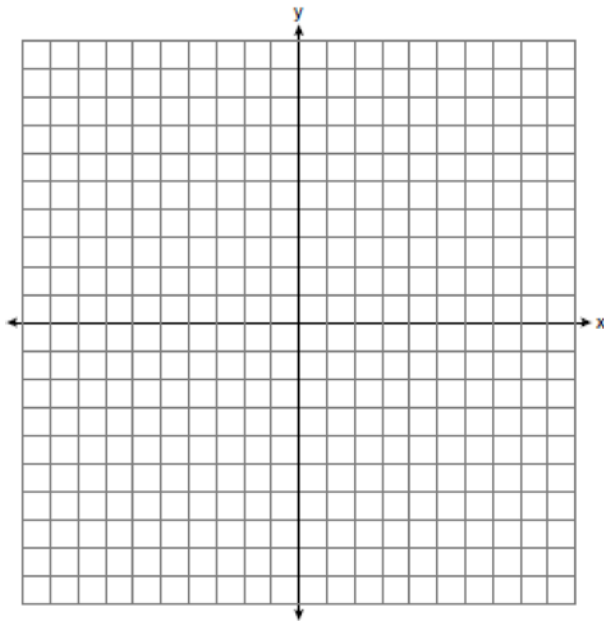
540 Graph $f(x) = |x + 1|$ on the set of axes below.
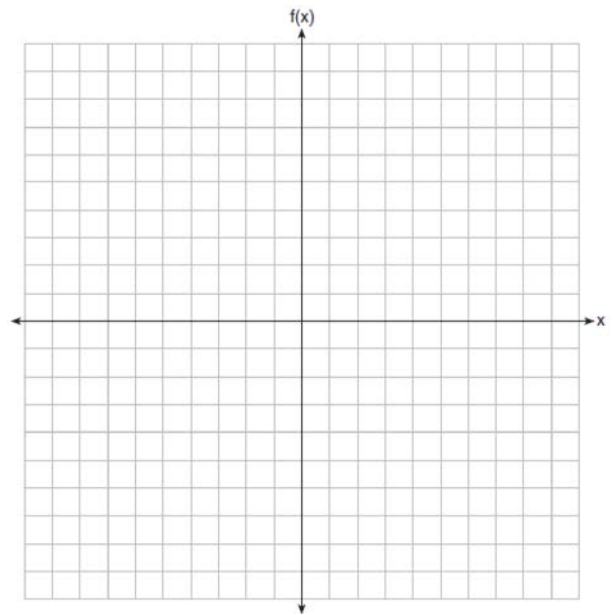
541  A function is graphed on the set of axes below.
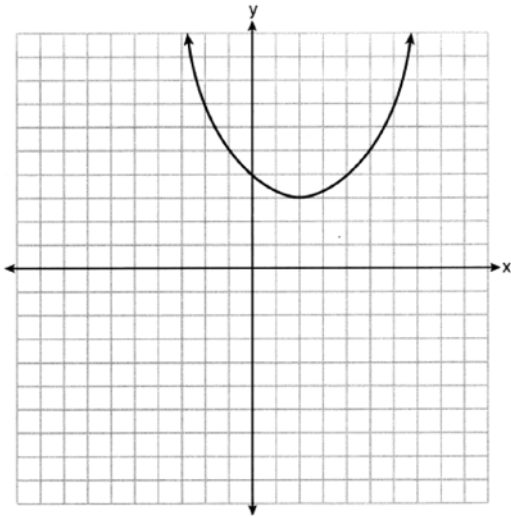


State the domain of this function. State the range of this function.

542  Mike knows that $(3,6.5)$ and $(4,17.55)$ are points on the graph of an exponential function, $g(x)$, and he wants to find another point on the graph of this function. First, he subtracts 6.5 from 17.55 to get 11.05. Next, he adds 11.05 and 17.55 to get 28.6. He states that $(5,28.6)$ is a point on $g(x)$. Is he correct? Explain your reasoning.

543  The function $f$ has a domain of $\{1,3,5,7\}$ and a range of $\{2,4,6\}$. Could $f$ be represented by $\{(1,2),(3,4),(5,6),(7,2)\}$? Justify your answer.

544  Describe the effect that each transformation below has on the function $f(x) = |x|$, where $a > 0$.
$g(x) = |x - a|$
$h(x) = |x| - a$

545  Graph the inequality $y > 2x - 5$ on the set of axes below. State the coordinates of a point in its solution.
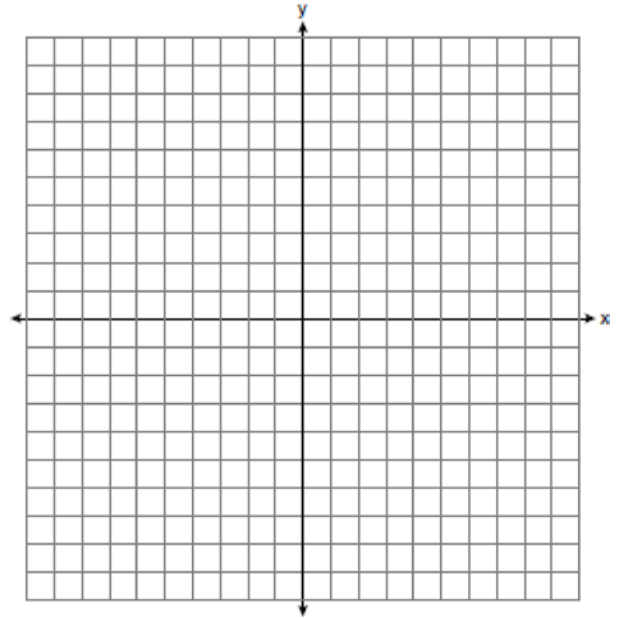


546  A student is given the functions $f(x) = (x + 1)^2$ and $g(x) = (x + 3)^2$. Describe the transformation that maps $f(x)$ onto $g(x)$.

547  Solve $3x^2 - 5x - 7 = 0$ algebraically for all values of $x$, rounding to the *nearest tenth*.

548  Determine algebraically the zeros of $f(x) = 3x^3 + 21x^2 + 36x$.

549 Nora says that the graph of a circle is a function because she can trace the whole graph without picking up her pencil. Mia says that a circle graph is *not* a function because multiple values of $x$ map to the same $y$-value. Determine if either one is correct, and justify your answer completely.

550 Rhonda deposited $3000 in an account in the Merrick National Bank, earning 4.2% interest, compounded annually. She made no deposits or withdrawals. Write an equation that can be used to find $B$, her account balance after $t$ years.

551 Solve the equation $4x^2 - 12x = 7$ algebraically for $x$.

552 Solve $6x^2 - 42 = 0$ for the exact values of $x$.

553 The formula for converting degrees Fahrenheit ($F$) to degrees Kelvin ($K$) is:

$$K = \frac{5}{9}(F + 459.67)$$

Solve for $F$, in terms of $K$.

554 Solve algebraically for $x$:
$3600 + 1.02x < 2000 + 1.04x$

555 Explain how to determine the zeros of $f(x) = (x+3)(x-1)(x-8)$. State the zeros of the function.

556 Find the zeros of $f(x) = (x-3)^2 - 49$, algebraically.

557 Guy and Jim work at a furniture store. Guy is paid $185 per week plus 3% of his total sales in dollars, $x$, which can be represented by $g(x) = 185 + 0.03x$. Jim is paid $275 per week plus 2.5% of his total sales in dollars, $x$, which can be represented by $f(x) = 275 + 0.025x$. Determine the value of $x$, in dollars, that will make their weekly pay the same.

558 A landscaper is creating a rectangular flower bed such that the width is half of the length. The area of the flower bed is 34 square feet. Write and solve an equation to determine the width of the flower bed, to the *nearest tenth of a foot*.

559 The residual plots from two different sets of bivariate data are graphed below.
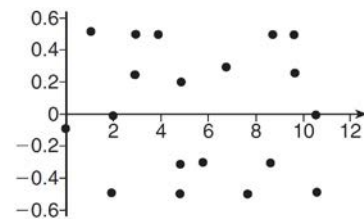


**Graph A**
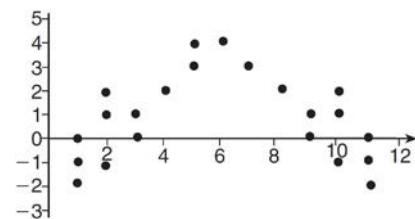


**Graph B**

Explain, using evidence from graph $A$ and graph $B$, which graph indicates that the model for the data is a good fit.

104

560  Factor completely:  $3y^2 - 12y - 288$

561  A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences.  The results of the survey are summarized in the table below.

| Programming Preferences | | |
|---|---|---|
| | Comedy | Drama |
| Male | 70 | 35 |
| Female | 48 | 42 |

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

562  On the set of axes below, graph the line whose equation is $2y = -3x - 2$.
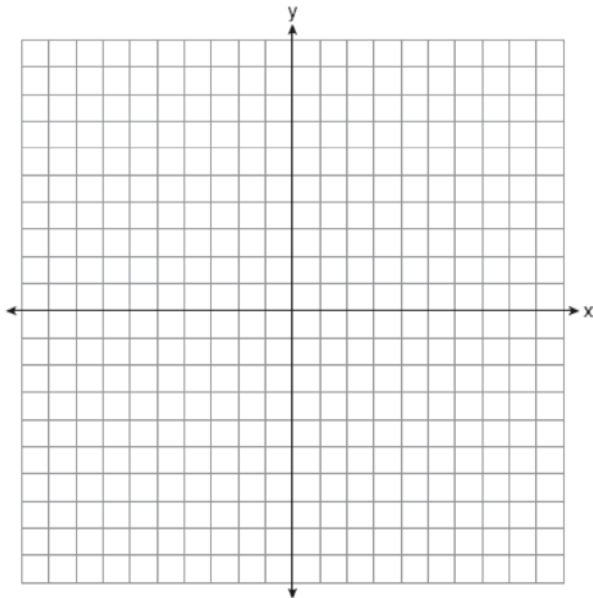


This linear equation contains the point $(2, k)$.  State the value of $k$.

563  Alex is selling tickets to a school play.  An adult ticket costs $6.50 and a student ticket costs $4.00. Alex sells $x$ adult tickets and 12 student tickets. Write a function, $f(x)$, to represent how much money Alex collected from selling tickets.

564  The formula for the sum of the degree measures of the interior angles of a polygon is $S = 180(n - 2)$. Solve for $n$, the number of sides of the polygon, in terms of $S$.

565  If $C = G - 3F$, find the trinomial that represents $C$ when $F = 2x^2 + 6x - 5$ and $G = 3x^2 + 4$.

566  Solve the equation for $y$:  $(y - 3)^2 = 4y - 12$

105

567 Graph the function $f(x) = -x^2 - 6x$ on the set of axes below.
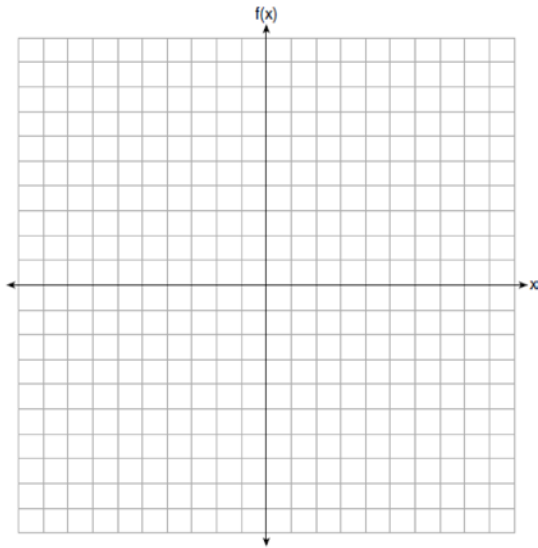


State the coordinates of the vertex of the graph.

568 Determine and state whether the sequence $1,3,9,27,\ldots$ displays exponential behavior. Explain how you arrived at your decision.

569 Express in simplest form:
$(3x^2 + 4x - 8) - (-2x^2 + 4x + 2)$

570 John and Sarah are each saving money for a car. The total amount of money John will save is given by the function $f(x) = 60 + 5x$. The total amount of money Sarah will save is given by the function $g(x) = x^2 + 46$. After how many weeks, $x$, will they have the same amount of money saved? Explain how you arrived at your answer.

571 Is the solution to the quadratic equation written below rational or irrational? Justify your answer.
$$0 = 2x^2 + 3x - 10$$

572 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

573 Graph the function $f(x) = 2^x - 7$ on the set of axes below.
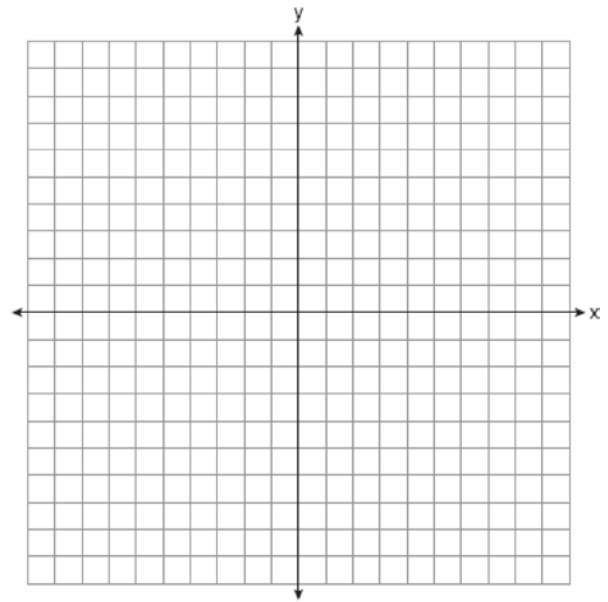


If $g(x) = 1.5x - 3$, determine if $f(x) > g(x)$ when $x = 4$. Justify your answer.

574 If $f(x) = x^2$ and $g(x) = x$, determine the value(s) of $x$ that satisfy the equation $f(x) = g(x)$.

575 Caleb claims that the ordered pairs shown in the table below are from a nonlinear function.

| x | f(x) |
|---|------|
| 0 | 2 |
| 1 | 4 |
| 2 | 8 |
| 3 | 16 |

State if Caleb is correct.  Explain your reasoning.

576 A blizzard occurred on the East Coast during January, 2016.  Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

| Washington, D.C. | |
|------|------|
| Time | Snow (inches) |
| 1 a.m. | 1 |
| 3 a.m. | 5 |
| 6 a.m. | 11 |
| 12 noon | 33 |
| 3 p.m. | 36 |

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greater rate of snowfall, in inches per hour?  Justify your answer.

577 Solve the equation below algebraically for the exact value of $x$.

$$6 - \frac{2}{3}(x+5) = 4x$$

578 Write the first five terms of the recursive sequence defined below.

$$a_1 = 0$$

$$a_n = 2\left(a_{n-1}\right)^2 - 1, \text{ for } n > 1$$

579 Write the expression $5x + 4x^2(2x+7) - 6x^2 - 9x$ as a polynomial in standard form.

580 Describe the transformations performed on the graph of $f(x) = x^2$ to obtain the graph of $g(x)$ when $g(x) = (x-3)^2 - 4$.

581 Solve $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$ for $x$.

582  Santina is considering a vacation and has obtained high-temperature data from the last two weeks for Miami and Los Angeles.

| **Miami** | 76 | 75 | 83 | 73 | 60 | 66 | 76 |
|---|---|---|---|---|---|---|---|
| | 81 | 83 | 85 | 83 | 87 | 80 | 80 |

| **Los Angeles** | 74 | 63 | 65 | 67 | 65 | 65 | 65 |
|---|---|---|---|---|---|---|---|
| | 62 | 62 | 72 | 69 | 64 | 64 | 61 |

Which location has less variability in temperatures?  Explain how you arrived at your answer.

583  Given that $a > b$, solve for $x$ in terms of $a$ and $b$:
$$b(x - 3) \geq ax + 7b$$

584  Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories.  Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.
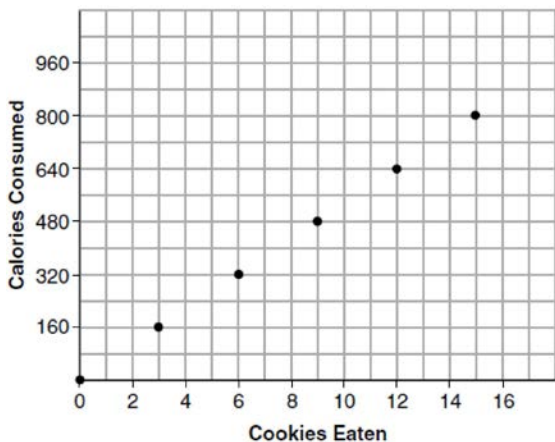


Explain why it is appropriate for Samantha to draw a line through the points on the graph.

585  When an apple is dropped from a tower 256 feet high, the function $h(t) = -16t^2 + 256$ models the height of the apple, in feet, after $t$ seconds. Determine, algebraically, the number of seconds it takes the apple to hit the ground.

586  Graph $f(x) = \sqrt{x + 2}$ over the domain $-2 \leq x \leq 7$.
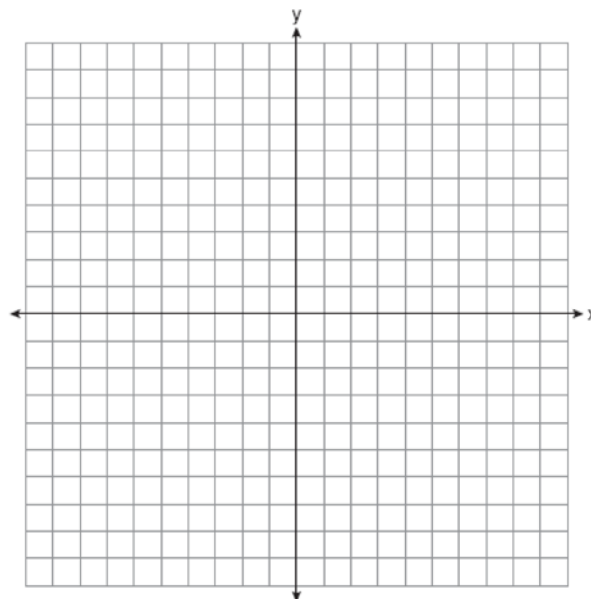
587 The graph below models the cost of renting video games with a membership in Plan $A$ and Plan $B$.
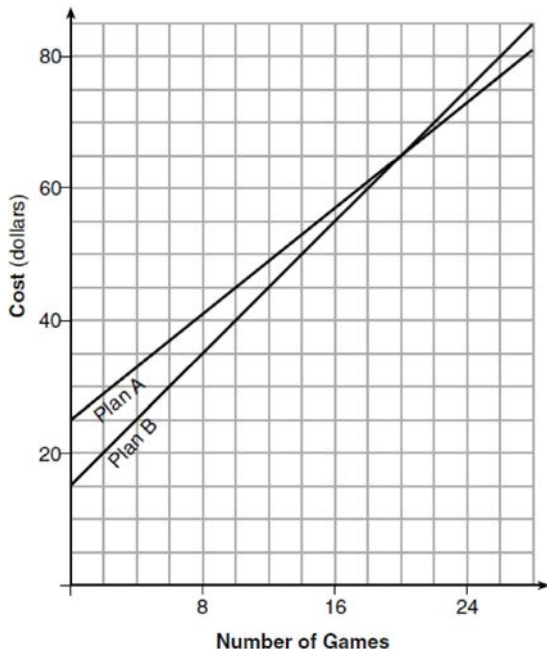


Explain why Plan $B$ is the better choice for Dylan if he only has $50 to spend on video games, including a membership fee. Bobby wants to spend $65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

588 Determine the exact values of $x$ for $x^2 - 8x - 5 = 0$ by completing the square.

589 Sue and Kathy were doing their algebra homework. They were asked to write the equation of the line that passes through the points $(-3, 4)$ and $(6, 1)$. Sue wrote $y - 4 = -\frac{1}{3}(x + 3)$ and Kathy wrote $y = -\frac{1}{3}x + 3$. Justify why both students are correct.

590 If the zeros of a quadratic function, $F$, are $-3$ and 5, what is the equation of the axis of symmetry of $F$? Justify your answer.

591 Solve the equation $x^2 - 6x = 15$ by completing the square.

592 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

593 The graph below shows the variation in the average temperature of Earth's surface from 1950-2000, according to one source.
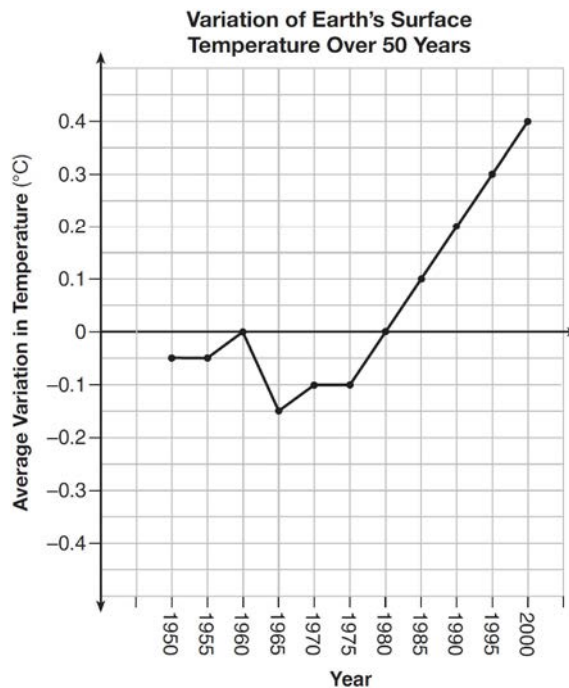


During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

594 John was given the equation $4(2a + 3) = -3(a - 1) + 31 - 11a$ to solve. Some of the steps and their reasons have already been completed. State a property of numbers for each missing reason.

$4(2a + 3) = -3(a - 1) + 31 - 11a$    Given

$8a + 12 = -3a + 3 + 31 - 11a$    _____

$8a + 12 = 34 - 14a$    Combining like terms

$22a + 12 = 34$    _____

595 A function is shown in the table below.

| x | f(x) |
|---|------|
| –4 | 2 |
| –1 | –4 |
| 0 | –2 |
| 3 | 16 |

If included in the table, which ordered pair, $(-4, 1)$ or $(1, -4)$, would result in a relation that is no longer a function? Explain your answer.

596 Marcel claims that the graph below represents a function.
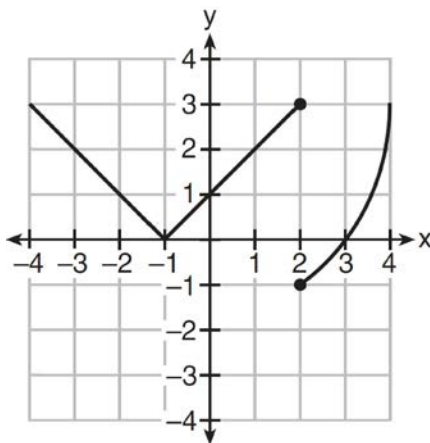


State whether Marcel is correct. Justify your answer.

597 Determine if the product of $3\sqrt{2}$ and $8\sqrt{18}$ is rational or irrational. Explain your answer.

598 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day $d$. Find $T(6)$, the minutes he will spend on the treadmill on day 6.

599 Determine and state the vertex of $f(x) = x^2 - 2x - 8$ using the method of completing the square.

110

600 During a recent snowstorm in Red Hook, NY, Jaime noted that there were 4 inches of snow on the ground at 3:00 p.m., and there were 6 inches of snow on the ground at 7:00 p.m. If she were to graph these data, what does the slope of the line connecting these two points represent in the context of this problem?

601 Graph the function $y = |x - 3|$ on the set of axes below.
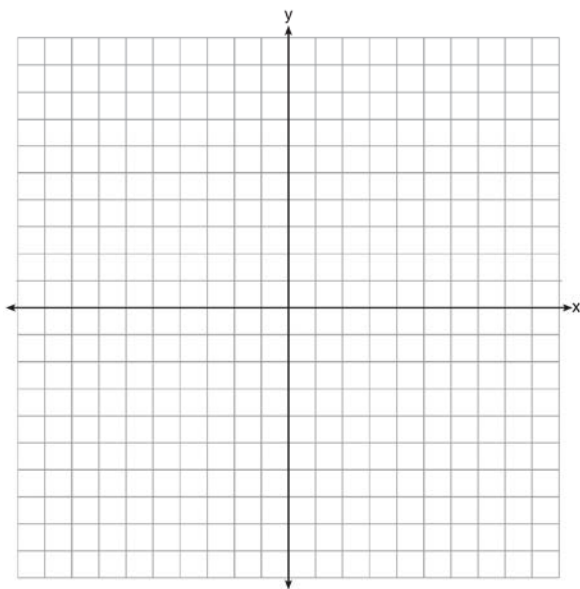
Explain how the graph of $y = |x - 3|$ has changed from the related graph $y = |x|$.

602 Dylan invested $600 in a savings account at a 1.6% annual interest rate. He made no deposits or withdrawals on the account for 2 years. The interest was compounded annually. Find, to the *nearest cent*, the balance in the account after 2 years.

603 On the set of axes below, graph the piecewise function:

$$f(x) = \begin{cases} -\dfrac{1}{2}x, & x < 2 \\ x, & x \geq 2 \end{cases}$$
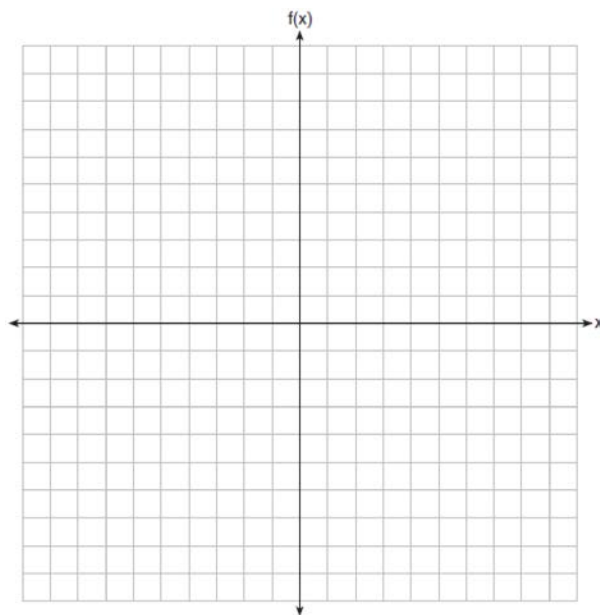
604 Using the formula for the volume of a cone, express $r$ in terms of $V$, $h$, and $\pi$.

605 A high school drama club is putting on their annual theater production. There is a maximum of 800 tickets for the show. The costs of the tickets are $6 before the day of the show and $9 on the day of the show. To meet the expenses of the show, the club must sell at least $5,000 worth of tickets.
a) Write a system of inequalities that represent this situation.
b) The club sells 440 tickets before the day of the show. Is it possible to sell enough additional tickets on the day of the show to at least meet the expenses of the show? Justify your answer.

606  Graph the function: $h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 4x - 5, & 0 \le x \le 5 \end{cases}$
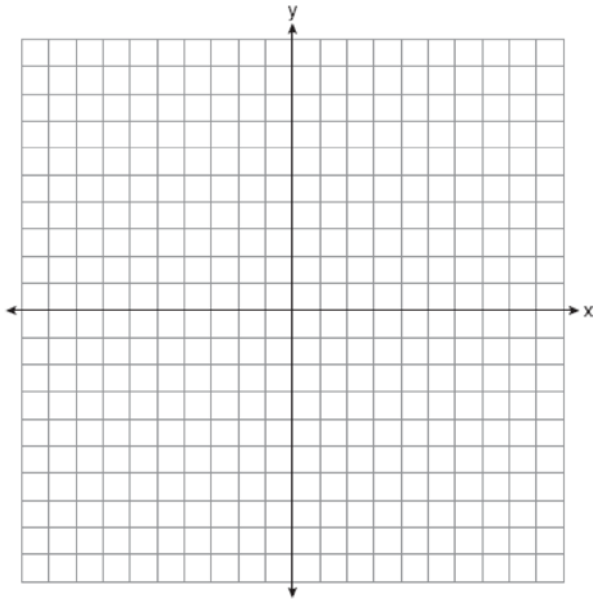
608  Graph the function $f(x) = \left| \dfrac{1}{2}x + 3 \right|$ over the interval $-8 \le x \le 0$.
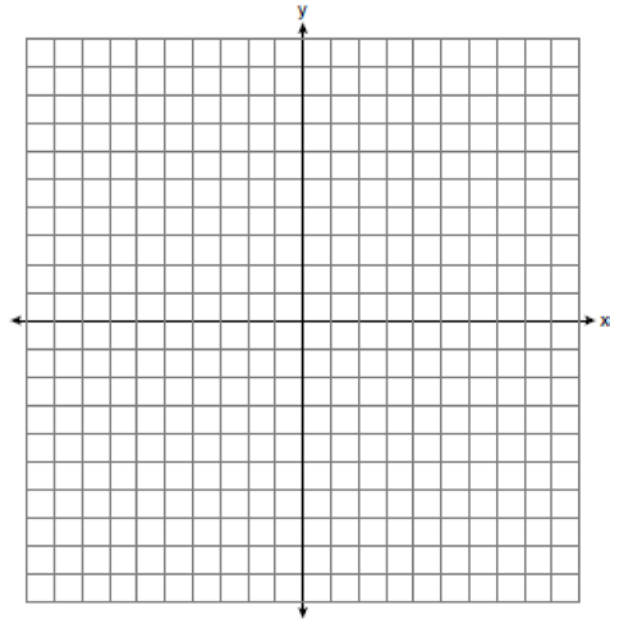
607  Richard is asked to transform the graph of $b(x)$ below.
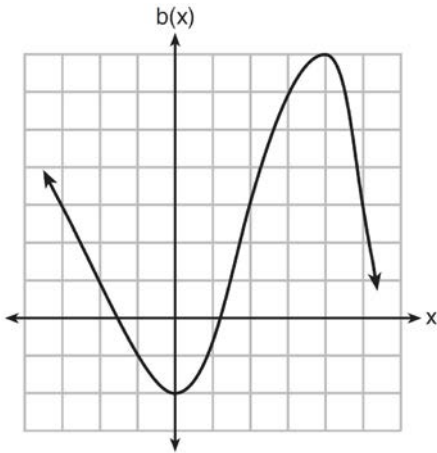
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$.  Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

609  Graph $f(x) = -\sqrt{x} + 1$ on the set of axes below.

112
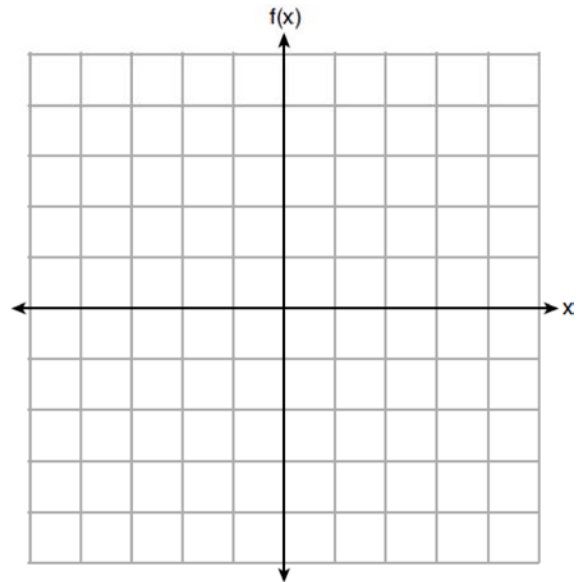
610 The table below shows the value of a particular car over time.

| Time (years) | Value (dollars) |
|---|---|
| 0 | 20,000 |
| 5 | 10,550 |
| 10 | 5570 |
| 15 | 2940 |
| 20 | 1550 |

Determine whether a linear or exponential function is more appropriate for modeling this data. Explain your choice.

611 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination. On the set of axes below, draw a graph that models the driver's distance from home.
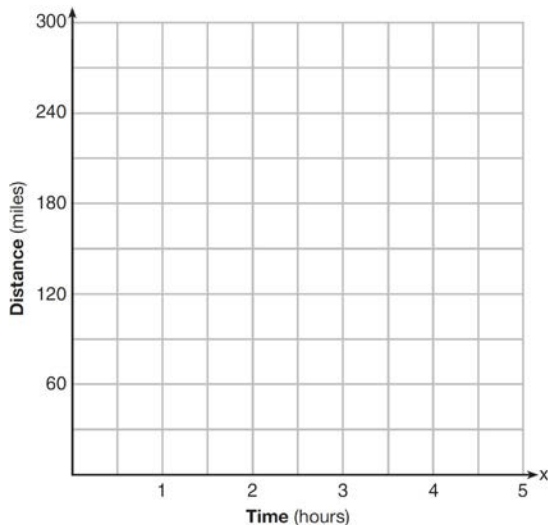


612 Factor the expression $x^4 - 36x^2$ completely.

613 In the equation $x^2 + 10x + 24 = (x + a)(x + b)$, $b$ is an integer. Find algebraically *all* possible values of $b$.

614 The temperature inside a cooling unit is measured in degrees Celsius, $C$. Josh wants to find out how cold it is in degrees Fahrenheit, $F$. Solve the formula $C = \dfrac{5}{9}(F - 32)$ for $F$ so that Josh can convert Celsius to Fahrenheit.

615 Solve $4w^2 + 12w - 44 = 0$ algebraically for $w$, to the *nearest hundredth*.

616 Solve $8m^2 + 20m = 12$ for $m$ by factoring.

617 A news report suggested that an adult should drink a minimum of 4 pints of water per day. Based on this report, determine the minimum amount of water an adult should drink, in fluid ounces, per week.

113

618 The graph of $f(t)$ models the height, in feet, that a bee is flying above the ground with respect to the time it traveled in $t$ seconds.
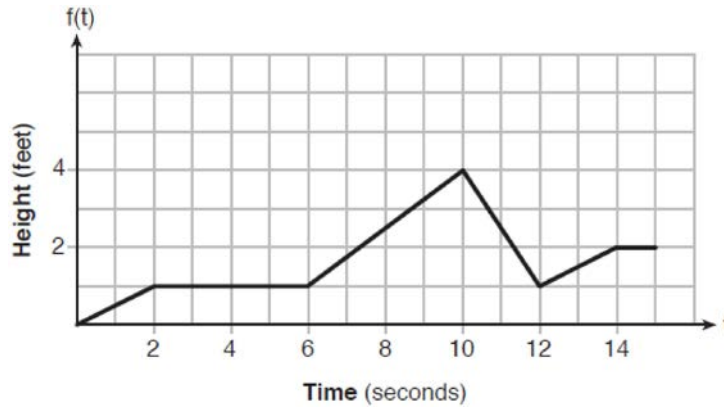


State all time intervals when the bee's rate of change is zero feet per second. Explain your reasoning.

619 Ms. Fox asked her class "Is the sum of 4.2 and $\sqrt{2}$ rational or irrational?" Patrick answered that the sum would be irrational. State whether Patrick is correct or incorrect. Justify your reasoning.

620 Use the method of completing the square to determine the exact values of $x$ for the equation $x^2 - 8x + 6 = 0$.

621 A student is in the process of solving an equation. The original equation and the first step are shown below.

Original: $3a + 6 = 2 - 5a + 7$

Step one: $3a + 6 = 2 + 7 - 5a$

Which property did the student use for the first step? Explain why this property is correct.

622 On the set of axes below, draw the graph of the equation $y = -\dfrac{3}{4}x + 3$.
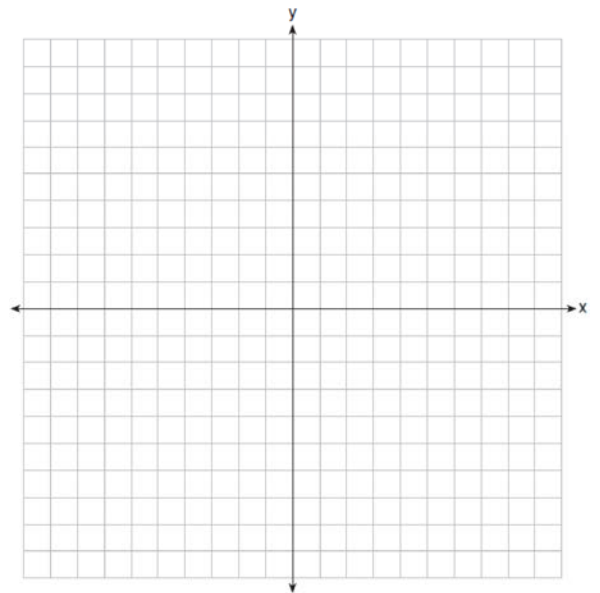


Is the point $(3,2)$ a solution to the equation? Explain your answer based on the graph drawn.

623   The table below represents the residuals for a line of best fit.

| x | 2 | 3 | 3 | 4 | 6 | 7 | 8 | 9 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|----|
| **Residual** | 2 | 1 | −1 | −2 | −3 | −2 | −1 | 2 | 0 | 3 |

Plot these residuals on the set of axes below.
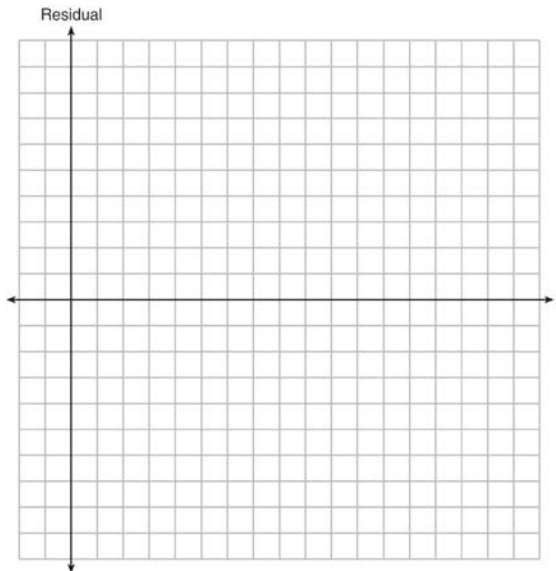
Residual

Using the plot, assess the fit of the line for these residuals and justify your answer.

624   The students in Mrs. Lankford's 4th and 6th period Algebra classes took the same test.  The results of the scores are shown in the following table:

| | $\bar{x}$ | $\sigma_x$ | $n$ | min | $Q_1$ | med | $Q_3$ | max |
|---|---|---|---|---|---|---|---|---|
| **4th Period** | 77.75 | 10.79 | 20 | 58 | 69 | 76.5 | 87.5 | 96 |
| **6th Period** | 78.4 | 9.83 | 20 | 59 | 71.5 | 78 | 88 | 96 |

Based on these data, which class has the larger spread of test scores?  Explain how you arrived at your answer.

625   Solve the equation below for $x$ in terms of $a$.
$$4(ax + 3) - 3ax = 25 + 3a$$

626 Four relations are shown below.
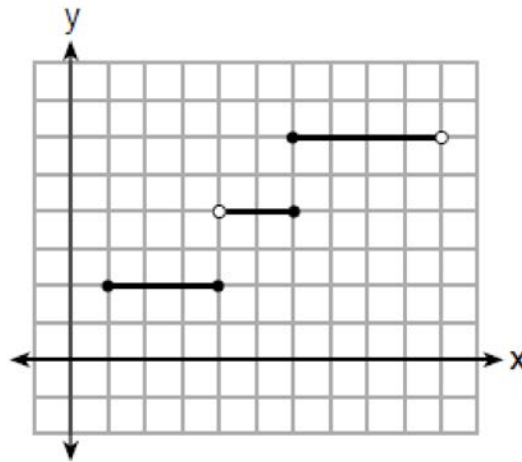


**I**

$$\{(1,2),(2,5),(3,8),(2,-5),(1,-2)\}$$
**II**

| x | y |
|---|---|
| −4 | 1 |
| 0 | 3 |
| 4 | 5 |
| 6 | 6 |

**III**

$$y = x^2$$
**IV**

State which relation(s) are functions. Explain why the other relation(s) are *not* functions.

627 The table below shows the height in feet, $h(t)$, of a hot-air balloon and the number of minutes, $t$, the balloon is in the air.

| Time (min) | 2 | 5 | 7 | 10 | 12 |
|---|---|---|---|---|---|
| Height (ft) | 64 | 168 | 222 | 318 | 369 |

The function $h(t) = 30.5t + 8.7$ can be used to model this data table. Explain the meaning of the slope in the context of the problem. Explain the meaning of the $y$-intercept in the context of the problem.

628  At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

| Mathematics | 55 | 93 | 89 | 60 | 90 | 45 | 64 | 76 | 89 |
|---|---|---|---|---|---|---|---|---|---|
| Physics | 66 | 89 | 94 | 52 | 84 | 56 | 66 | 73 | 92 |

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data.  Explain what the correlation coefficient means with regard to the context of this situation.

629  The school newspaper surveyed the student body for an article about club membership.  The table below shows the number of students in each grade level who belong to one or more clubs.

|  | 1 Club | 2 Clubs | 3 or More Clubs |
|---|---|---|---|
| 9th | 90 | 33 | 12 |
| 10th | 125 | 12 | 15 |
| 11th | 87 | 22 | 18 |
| 12th | 75 | 27 | 23 |

If there are 180 students in ninth grade, what percentage of the ninth grade students belong to more than one club?

630  A survey of 100 students was taken.  It was found that 60 students watched sports, and 34 of these students did not like pop music.  Of the students who did *not* watch sports, 70% liked pop music.  Complete the two-way frequency table.

|  | Watch Sports | Don't Watch Sports | Total |
|---|---|---|---|
| Like Pop |  |  |  |
| Don't Like Pop |  |  |  |
| Total |  |  |  |

631  The formula $a = \dfrac{v_f - v_i}{t}$ is used to calculate acceleration as the change in velocity over the period of time.  Solve the formula for the final velocity, $v_f$, in terms of initial velocity, $v_i$, acceleration, $a$, and time, $t$.

632  Determine the smallest integer that makes $-3x + 7 - 5x < 15$ true.

633  State whether the product of $\sqrt{3}$ and $\sqrt{9}$ is rational or irrational.  Explain your answer.

634 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

|  | Sun | Mon | Tues | Wed | Thurs |
|---|---|---|---|---|---|
| **Week 1** | 4 | 3 | 3.5 | 2 | 2 |
| **Week 2** | 4.5 | 5 | 2.5 | 3 | 1.5 |
| **Week 3** | 4 | 3 | 1 | 1.5 | 2.5 |

Using an appropriate scale on the number line below, construct a box plot for the 15 values.

635 The function, $t(x)$, is shown in the table below.

| x | t(x) |
|---|---|
| −3 | 10 |
| −1 | 7.5 |
| 1 | 5 |
| 3 | 2.5 |
| 5 | 0 |

Determine whether $t(x)$ is linear or exponential. Explain your answer.

636 The number of people who attended a school's last six basketball games increased as the team neared the state sectional games. The table below shows the data.

| Game | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|
| **Attendance** | 348 | 435 | 522 | 609 | 696 | 783 |

State the type of function that best fits the given data. Justify your choice of a function type.

637 Express $(3x - 4)(x + 7) - \frac{1}{4}x^2$ as a trinomial in standard form.

638 The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. Solve the equation for $h$ in terms of $V$, $r$, and $\pi$.

639 Ryker is given the graph of the function
$y = \frac{1}{2}x^2 - 4$. He wants to find the zeros of the
function, but is unable to read them exactly from
the graph.
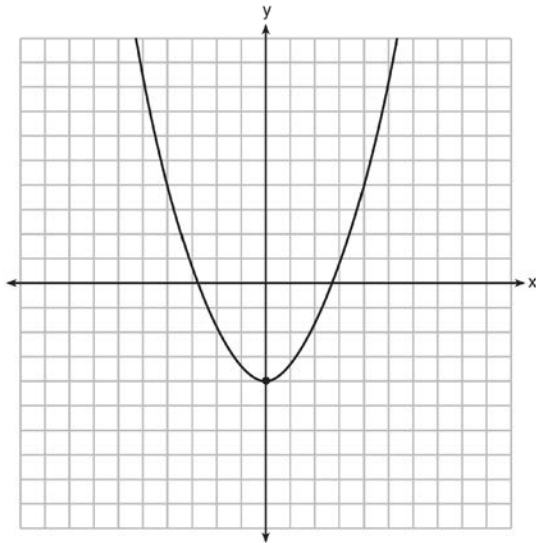


Find the zeros in simplest radical form.

640 The number of carbon atoms in a fossil is given by
the function $y = 5100(0.95)^x$, where $x$ represents
the number of years since being discovered. What
is the percent of change each year? Explain how
you arrived at your answer.

641 Given $2x + ax - 7 > -12$, determine the largest
integer value of $a$ when $x = -1$.

642 Jakob is working on his math homework. He
decides that the sum of the expression $\frac{1}{3} + \frac{6\sqrt{5}}{7}$
must be rational because it is a fraction. Is Jakob
correct? Explain your reasoning.

643 The total profit earned at a garage sale during the
first five hours is modeled by the graph shown
below.
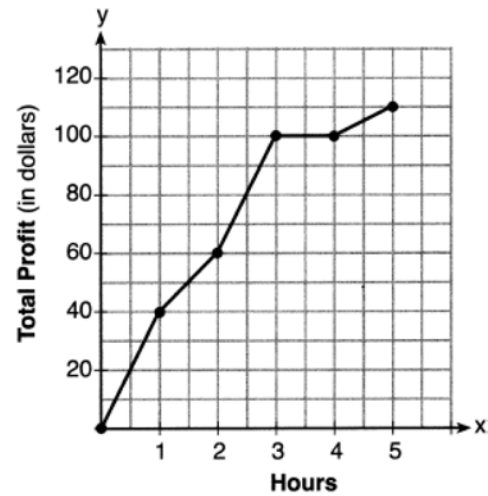


Determine the average rate of change, in dollars per
hour, over the interval $1 \le x \le 4$.

644 If the difference $(3x^2 - 2x + 5) - (x^2 + 3x - 2)$ is
multiplied by $\frac{1}{2}x^2$, what is the result, written in
standard form?

645 Solve algebraically for $x$:
$$-\frac{2}{3}(x + 12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

646 Maria orders T-shirts for her volleyball camp.
Adult-sized T-shirts cost $6.25 each and
youth-sized T-shirts cost $4.50 each. Maria has
$550 to purchase both adult-sized and youth-sized
T-shirts. If she purchases 45 youth-sized T-shirts,
determine algebraically the maximum number of
adult-sized T-shirts she can purchase.

119

647 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

| Day (n) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Height (cm) | 3.0 | 4.5 | 6.0 | 7.5 | 9.0 |

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the $n$th day.

648 Graph the following piecewise function on the set of axes below.
$$f(x) = \begin{cases} |x|, & -5 \le x < 2 \\ -2x + 10, & 2 \le x \le 6 \end{cases}$$
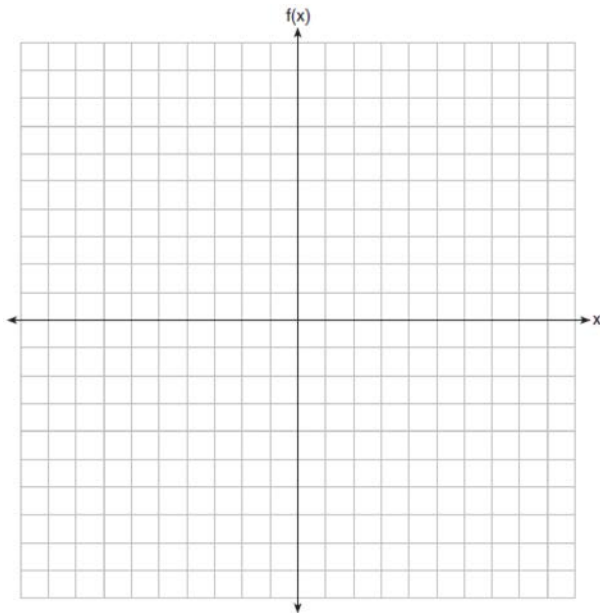


649 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

650 Is the product of $\sqrt{8}$ and $\sqrt{98}$ rational or irrational? Justify your answer.

651 Is the product of $\sqrt{16}$ and $\frac{4}{7}$ rational or irrational? Explain your reasoning.

652 Given that $f(x) = 2x + 1$, find $g(x)$ if $g(x) = 2[f(x)]^2 - 1$.

653 Solve for $x$ to the *nearest tenth*: $x^2 + x - 5 = 0$.

654 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down −4. Do you agree with Pat's answer? Explain your reasoning.

655 If $g(x) = -4x^2 - 3x + 2$, determine $g(-2)$.

656 Factor $x^4 - 16$ completely.

657 The ages of the last 16 United States presidents on their first inauguration day are shown in the table below.

| 51 | 54 | 51 | 60 |
|----|----|----|----|
| 62 | 43 | 55 | 56 |
| 61 | 52 | 69 | 64 |
| 46 | 54 | 47 | 70 |

Determine the interquartile range for this set of data.

658 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2, -1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer. [The use of the set of axes below is optional.]
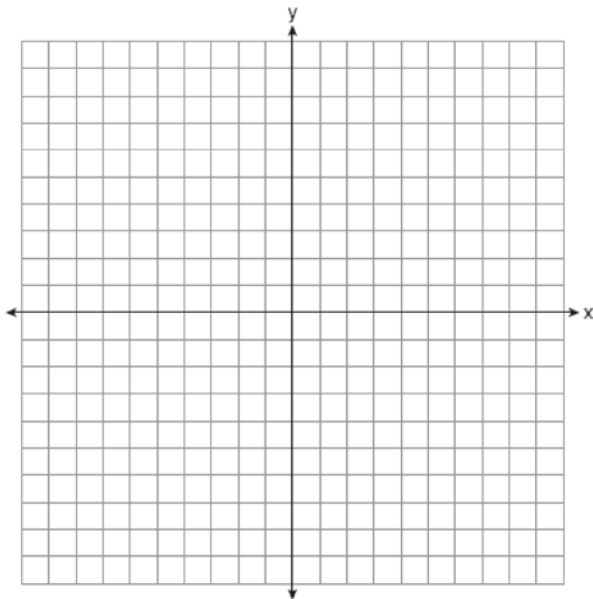


659 A teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

Explain why $a + b$ is irrational, but $b + c$ is rational.

660 Solve the inequality below:
$$1.8 - 0.4y \geq 2.2 - 2y$$

661 The cost of one pound of grapes, $g$, is 15 cents more than one pound of apples, $a$. The cost of one pound of bananas, $b$, is twice as much as one pound of grapes. Write an equation that represents the cost of one pound of bananas in terms of the cost of one pound of apples.

662 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for $m$ months of membership. State the meaning of the slope and $y$-intercept of this function with respect to the costs associated with the gym membership.

663 Sandy programmed a website's checkout process with an equation to calculate the amount customers will be charged when they download songs. The website offers a discount. If one song is bought at the full price of $1.29, then each additional song is $.99. State an equation that represents the cost, $C$, when $s$ songs are downloaded. Sandy figured she would be charged $52.77 for 52 songs. Is this the correct amount? Justify your answer.

664 The table below represents the height of a bird above the ground during flight, with $P(t)$ representing height in feet and $t$ representing time in seconds.

| t | P(t) |
|---|------|
| 0 | 6.71 |
| 3 | 6.26 |
| 4 | 6 |
| 9 | 3.41 |

Calculate the average rate of change from 3 to 9 seconds, in feet per second.

665 Use the method of completing the square to determine the vertex of $f(x) = x^2 - 14x - 15$. State the coordinates of the vertex.

666 Is the product of $\sqrt{1024}$ and $-3.4$ rational or irrational? Explain your reasoning.

667 Donna wants to make trail mix made up of almonds, walnuts and raisins. She wants to mix one part almonds, two parts walnuts, and three parts raisins. Almonds cost $12 per pound, walnuts cost $9 per pound, and raisins cost $5 per pound. Donna has $15 to spend on the trail mix. Determine how many pounds of trail mix she can make. [Only an algebraic solution can receive full credit.]
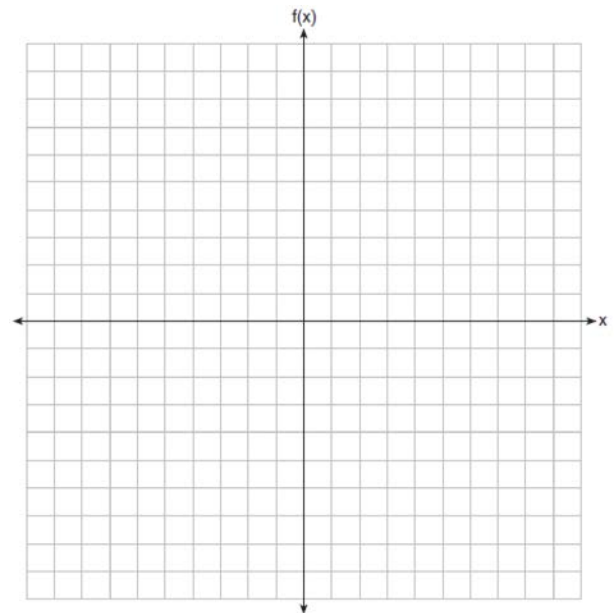
668 Solve the following equation by completing the square: $x^2 + 4x = 2$

669 Solve $x^2 - 8x - 9 = 0$ algebraically. Explain the first step you used to solve the given equation.

670 Solve $6x^2 + 5x - 6 = 0$ algebraically for the exact values of $x$.

671 Graph the following function on the set of axes below.
$$f(x) = \begin{cases} |x|, & -3 \le x < 1 \\ 4, & 1 \le x \le 8 \end{cases}$$



122

672  In the diagram below, $f(x) = x^3 + 2x^2$ is graphed. Also graphed is $g(x)$, the result of a translation of $f(x)$.
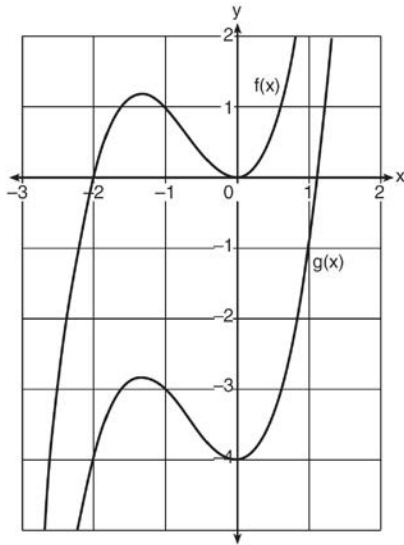


Determine an equation of $g(x)$. Explain your reasoning.

673  Consider the pattern of squares shown below:



Which type of model, linear or exponential, should be used to determine how many squares are in the $n$th pattern? Explain your answer.

674  A typical marathon is 26.2 miles. Allan averages 12 kilometers per hour when running in marathons. Determine how long it would take Allan to complete a marathon, to the *nearest tenth of an hour*. Justify your answer.

675  Subtract $5x^2 + 2x - 11$ from $3x^2 + 8x - 7$. Express the result as a trinomial.

676  A formula for determining the finite sum, $S$, of an arithmetic sequence of numbers is $S = \dfrac{n}{2}(a + b)$, where $n$ is the number of terms, $a$ is the first term, and $b$ is the last term. Express $b$ in terms of $a$, $S$, and $n$.

677  The graph of the function $p(x)$ is represented below. On the same set of axes, sketch the function $p(x + 2)$.
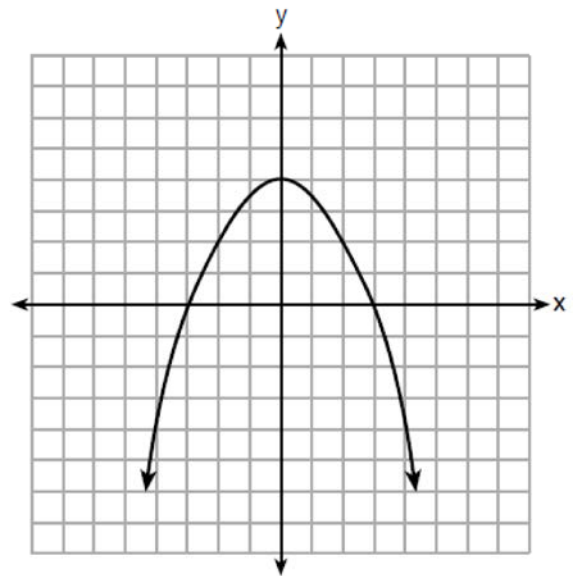


678  In attempting to solve the system of equations $y = 3x - 2$ and $6x - 2y = 4$, John graphed the two equations on his graphing calculator. Because he saw only one line, John wrote that the answer to the system is the empty set. Is he correct? Explain your answer.

679 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where $t$ is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

680 Solve $5x^2 = 180$ algebraically.

681 Write an exponential equation for the graph shown below.
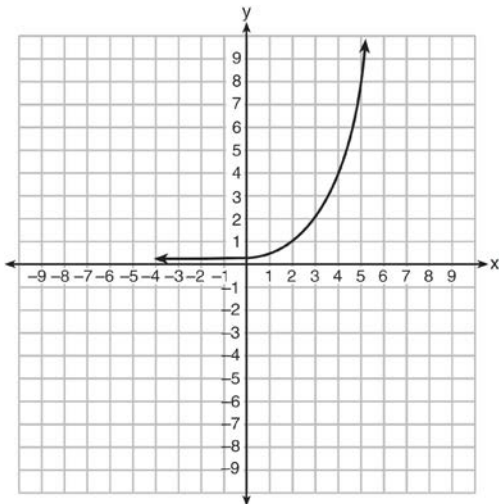


Explain how you determined the equation.

682 Factor the expression $x^4 + 6x^2 - 7$ completely.

683 Solve the quadratic equation below for the exact values of $x$.
$$4x^2 - 5 = 75$$

684 The value, $v(t)$, of a car depreciates according to the function $v(t) = P(.85)^t$, where $P$ is the purchase price of the car and $t$ is the time, in years, since the car was purchased. State the percent that the value of the car *decreases* by each year. Justify your answer.

685 On the set of axes below, draw the graph of $y = x^2 - 4x - 1$.
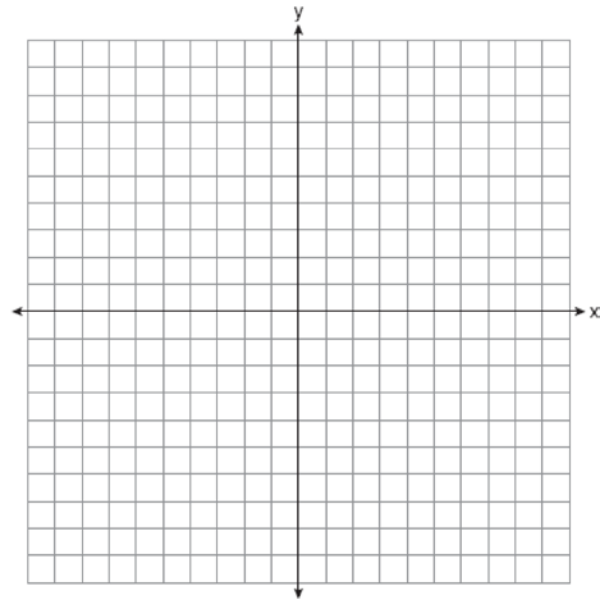


State the equation of the axis of symmetry.

## Algebra I 4 Point Regents Exam Questions

686   A nutritionist collected information about different brands of beef hot dogs. She made a table showing the number of Calories and the amount of sodium in each hot dog.

| Calories per Beef Hot Dog | Milligrams of Sodium per Beef Hot Dog |
|---|---|
| 186 | 495 |
| 181 | 477 |
| 176 | 425 |
| 149 | 322 |
| 184 | 482 |
| 190 | 587 |
| 158 | 370 |
| 139 | 322 |

a) Write the correlation coefficient for the line of best fit. Round your answer to the *nearest hundredth.*
b) Explain what the correlation coefficient suggests in the context of this problem.

687   A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of $x$ meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.
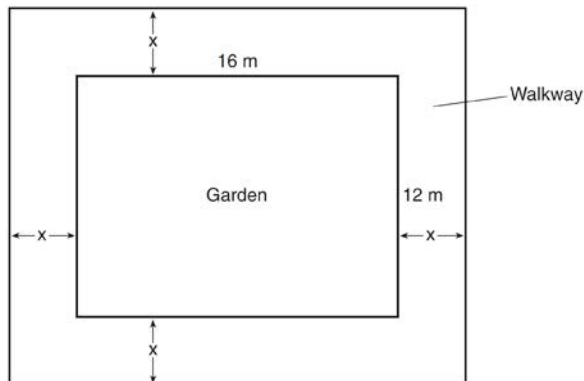


Write an equation that can be used to find $x$, the width of the walkway. Describe how your equation models the situation. Determine and state the width of the walkway, in meters.

688   The formula for the area of a trapezoid is $A = \frac{1}{2} h(b_1 + b_2)$. Express $b_1$ in terms of $A$, $h$, and $b_2$. The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

689   The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, $r$, in terms of $V$ and $h$. Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

690  An application developer released a new app to be downloaded.  The table below gives the number of downloads for the first four weeks after the launch of the app.

| Number of Weeks | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Number of Downloads | 120 | 180 | 270 | 405 |

Write an exponential equation that models these data.  Use this model to predict how many downloads the developer would expect in the 26th week if this trend continues.  Round your answer to the nearest download.  Would it be reasonable to use this model to predict the number of downloads past one year?  Explain your reasoning.

691  The function $r(x)$ is defined by the expression $x^2 + 3x - 18$. Use factoring to determine the zeros of $r(x)$.  Explain what the zeros represent on the graph of $r(x)$.

692  The graph of an inequality is shown below.
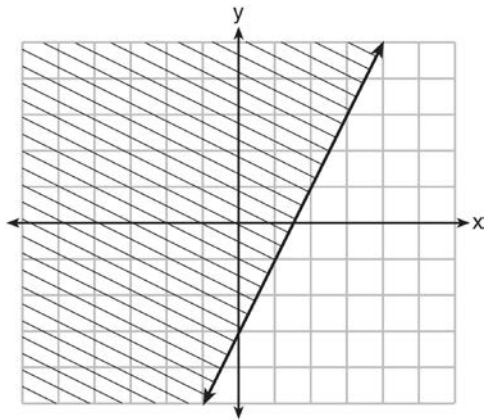


a) Write the inequality represented by the graph.
b) On the same set of axes, graph the inequality $x + 2y < 4$.
c) The two inequalities graphed on the set of axes form a system.  Oscar thinks that the point $(2,1)$ is in the solution set for this system of inequalities.  Determine and state whether you agree with Oscar.  Explain your reasoning.

693  An airplane leaves New York City and heads toward Los Angeles.  As it climbs, the plane gradually increases its speed until it reaches cruising altitude, at which time it maintains a constant speed for several hours as long as it stays at cruising altitude.  After flying for 32 minutes, the plane reaches cruising altitude and has flown 192 miles.  After flying for a total of 92 minutes, the plane has flown a total of 762 miles.  Determine the speed of the plane, at cruising altitude, in miles per minute.  Write an equation to represent the number of miles the plane has flown, $y$, during $x$ minutes at cruising altitude, only.  Assuming that the plane maintains its speed at cruising altitude, determine the total number of miles the plane has flown 2 hours into the flight.

694  Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

Line 1   $0 = 64x^2 + 16x - 3$
Line 2   $0 = B^2 + 2B - 3$
Line 3   $0 = (B + 3)(B - 1)$

Use Janice's procedure to solve the equation for $x$.  Explain the method Janice used to solve the quadratic equation.

695 About a year ago, Joey watched an online video of a band and noticed that it had been viewed only 843 times. One month later, Joey noticed that the band's video had 1708 views. Joey made the table below to keep track of the cumulative number of views the video was getting online.

| Months Since First Viewing | Total Views |
|---|---|
| 0 | 843 |
| 1 | 1708 |
| 2 | forgot to record |
| 3 | 7124 |
| 4 | 14,684 |
| 5 | 29,787 |
| 6 | 62,381 |

a) Write a regression equation that best models these data. Round all values to the *nearest hundredth*. Justify your choice of regression equation. b) As shown in the table, Joey forgot to record the number of views after the second month. Use the equation from part *a* to estimate the number of full views of the online video that Joey forgot to record.

696 The following table represents a sample of sale prices, in thousands of dollars, and number of new homes available at that price in 2017.

| Sale Price, p (in thousands of dollars) | 160 | 180 | 200 | 220 | 240 | 260 | 280 |
|---|---|---|---|---|---|---|---|
| Number of New Homes Available f(p) | 126 | 103 | 82 | 75 | 82 | 40 | 20 |

State the linear regression function, $f(p)$, that estimates the number of new homes available at a specific sale price, $p$. Round all values to the *nearest hundredth*. State the correlation coefficient of the data to the *nearest hundredth*. Explain what this means in the context of the problem.

697 David has two jobs. He earns $8 per hour babysitting his neighbor's children and he earns $11 per hour working at the coffee shop. Write an inequality to represent the number of hours, $x$, babysitting and the number of hours, $y$, working at the coffee shop that David will need to work to earn a minimum of $200. David worked 15 hours at the coffee shop. Use the inequality to find the number of full hours he must babysit to reach his goal of $200.

698 A school is building a rectangular soccer field that has an area of 6000 square yards. The soccer field must be 40 yards longer than its width. Determine algebraically the dimensions of the soccer field, in yards.

699 Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph. The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination. After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

700 On the set of axes below, graph the following system of inequalities:
$$2x + y \geq 8$$
$$y - 5 < 3x$$
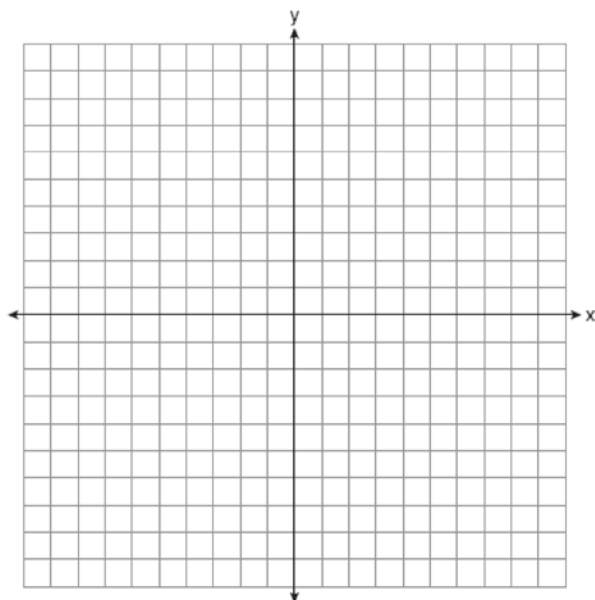


Determine if the point $(1,8)$ is in the solution set. Explain your answer.

701 The length of a rectangular sign is 6 inches more than half its width. The area of this sign is 432 square inches. Write an equation in one variable that could be used to find the number of inches in the dimensions of this sign. Solve this equation algebraically to determine the dimensions of this sign, in inches.

702 On the set of axes below, graph the function $y = |x + 1|$.
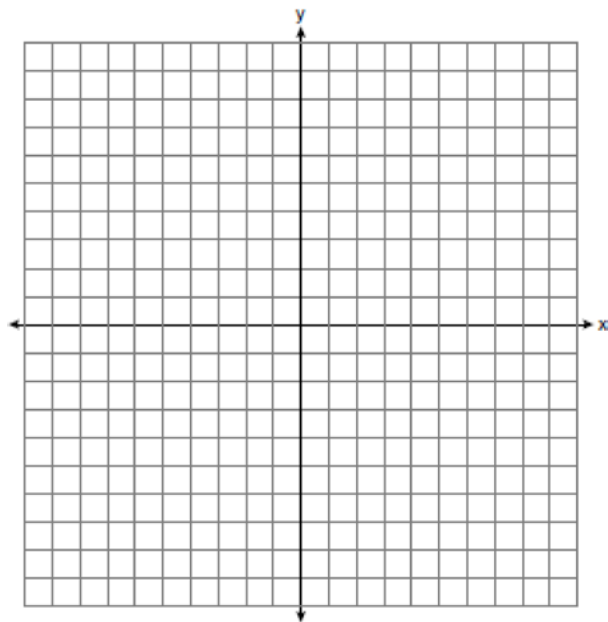


State the range of the function. State the domain over which the function is increasing.

703 Solve for $x$ algebraically:
$$7x - 3(4x - 8) \leq 6x + 12 - 9x$$
If $x$ is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

704 An on-line electronics store must sell at least $2500 worth of printers and computers per day. Each printer costs $50 and each computer costs $500. The store can ship a maximum of 15 items per day. On the set of axes below, graph a system of inequalities that models these constraints.



Number of Printers
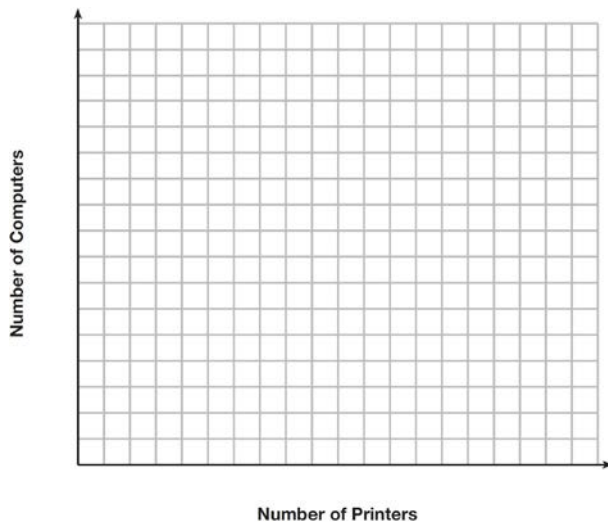
Determine a combination of printers and computers that would allow the electronics store to meet all of the constraints. Explain how you obtained your answer.

705 A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company A charges a $50 set-up fee and $5 per shirt. Company B charges a $25 set-up fee and $6 per shirt. Write an equation for Company A that could be used to determine the total cost, A, when x shirts are ordered. Write a second equation for Company B that could be used to determine the total cost, B, when x shirts are ordered. Determine algebraically and state the minimum number of shirts that must be ordered for it to be cheaper to use Company A.

706 Jacob and Zachary go to the movie theater and purchase refreshments for their friends. Jacob spends a total of $18.25 on two bags of popcorn and three drinks. Zachary spends a total of $27.50 for four bags of popcorn and two drinks. Write a system of equations that can be used to find the price of one bag of popcorn and the price of one drink. Using these equations, determine and state the price of a bag of popcorn and the price of a drink, to the *nearest cent.*

707 An animal shelter spends $2.35 per day to care for each cat and $5.50 per day to care for each dog. Pat noticed that the shelter spent $89.50 caring for cats and dogs on Wednesday. Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday. Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer. Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

708 A population of rabbits in a lab, $p(x)$, can be modeled by the function $p(x) = 20(1.014)^x$, where x represents the number of days since the population was first counted. Explain what 20 and 1.014 represent in the context of the problem. Determine, to the *nearest tenth*, the average rate of change from day 50 to day 100.

709 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters. Determine, algebraically, the dimensions of the garden in meters.

710 Tanya is making homemade greeting cards. The data table below represents the amount she spends in dollars, $f(x)$, in terms of the number of cards she makes, $x$.

| x | f(x) |
|---|------|
| 4 | 7.50 |
| 6 | 9 |
| 9 | 11.25 |
| 10 | 12 |

Write a linear function, $f(x)$, that represents the data. Explain what the slope and $y$-intercept of $f(x)$ mean in the given context.

711 Alex launched a ball into the air. The height of the ball can be represented by the equation $h = -8t^2 + 40t + 5$, where $h$ is the height, in units, and $t$ is the time, in seconds, after the ball was launched. Graph the equation from $t = 0$ to $t = 5$ seconds.
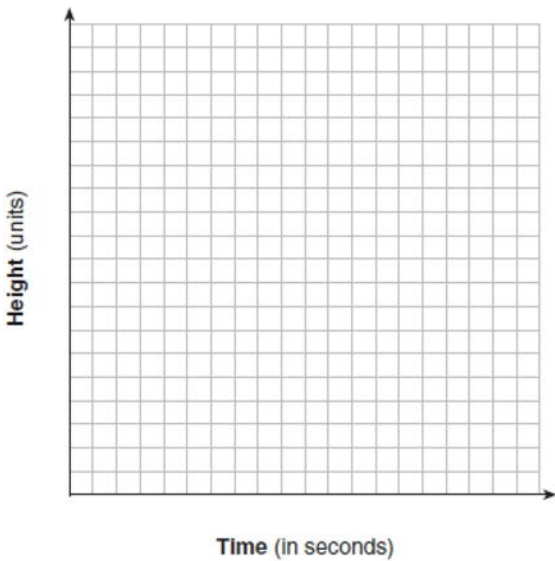


State the coordinates of the vertex and explain its meaning in the context of the problem.

712 Graph $y = f(x)$ and $y = g(x)$ on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$
$$g(x) = -2x + 3$$



Determine and state all values of $x$ for which $f(x) = g(x)$.

130
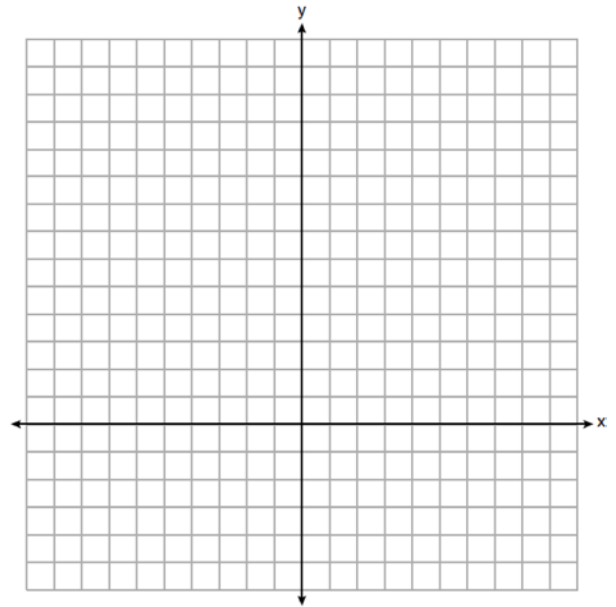
713 Hannah went to the school store to buy supplies and spent $16. She bought four more pencils than pens and two fewer erasers than pens. Pens cost $1.25 each, pencils cost $0.55 each, and erasers cost $0.75 each. If $x$ represents the number of pens Hannah bought, write an equation in terms of $x$ that can be used to find how many of each item she bought. Use your equation to determine algebraically how many pens Hannah bought.

714 A car was purchased for $25,000. Research shows that the car has an average yearly depreciation rate of 18.5%. Create a function that will determine the value, $V(t)$, of the car $t$ years after purchase. Determine, to the *nearest cent*, how much the car will depreciate from year 3 to year 4.

715 The table below lists the total cost for parking for a period of time on a street in Albany, N.Y. The total cost is for any length of time up to and including the hours parked. For example, parking for up to and including 1 hour would cost $1.25; parking for 3.5 hours would cost $5.75.

| Hours Parked | Total Cost |
|---|---|
| 1 | 1.25 |
| 2 | 2.50 |
| 3 | 4.00 |
| 4 | 5.75 |
| 5 | 7.75 |
| 6 | 10.00 |

Graph the step function that represents the cost for the number of hours parked.
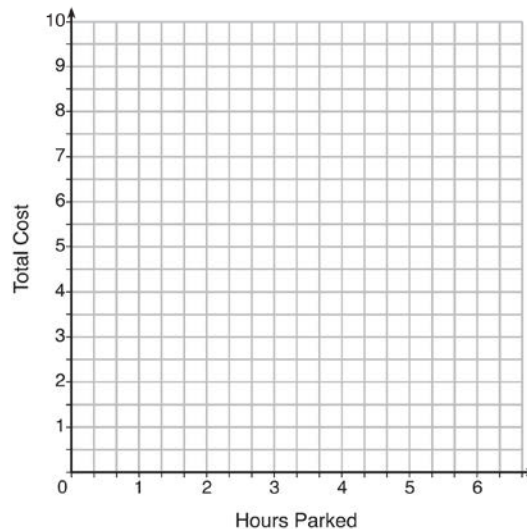


Explain how the cost per hour to park changes over the six-hour period.

716 Myranda received a movie gift card for $100 to her local theater. Matinee tickets cost $7.50 each and evening tickets cost $12.50 each. If $x$ represents the number of matinee tickets she could purchase, and $y$ represents the number of evening tickets she could purchase, write an inequality that represents all the possible ways Myranda could spend her gift card on movies at the theater. On the set of axes below, graph this inequality.



Number of Matinee Tickets
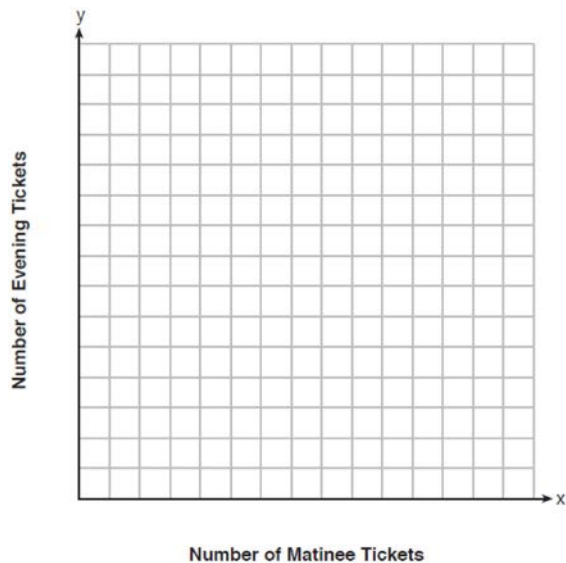
What is the maximum number of matinee tickets Myranda could purchase with her gift card? Explain your answer.

717 Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled $15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled $45.90. Write and solve a system of equations to determine the price of one plain pizza. [Only an algebraic solution can receive full credit.]

718 On the day Alexander was born, his father invested $5000 in an account with a 1.2% annual growth rate. Write a function, $A(t)$, that represents the value of this investment $t$ years after Alexander's birth. Determine, to the *nearest dollar*, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

719 On the set of axes below, graph
$$g(x) = \frac{1}{2}x + 1$$

and

$$f(x) = \begin{cases} 2x + 1, & x \le -1 \\ 2 - x^2, & x > -1 \end{cases}$$
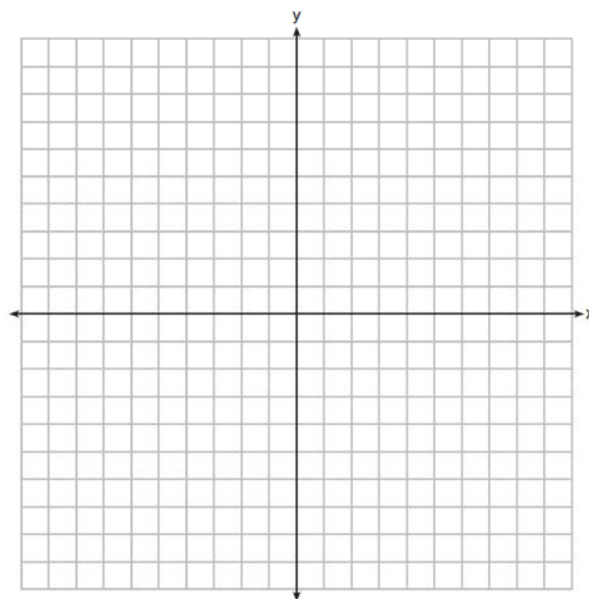


How many values of $x$ satisfy the equation $f(x) = g(x)$? Explain your answer, using evidence from your graphs.

720 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.
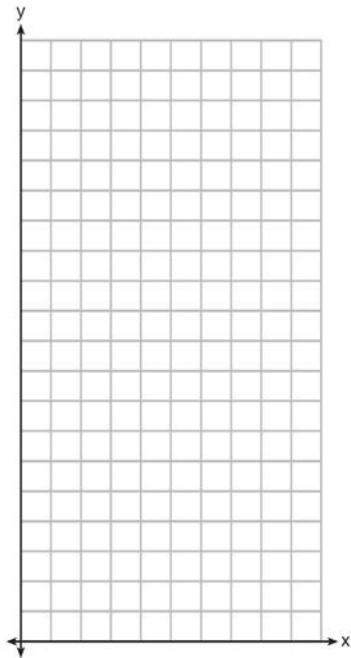
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

721 Jim is a furniture salesman. His weekly pay is $300 plus 3.5% of his total sales for the week. Jim sells $x$ dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week. Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is $8250.

722 Given: $g(x) = 2x^2 + 3x + 10$

$$k(x) = 2x + 16$$

Solve the equation $g(x) = 2k(x)$ algebraically for $x$, to the *nearest tenth*. Explain why you chose the method you used to solve this quadratic equation.

723 Michael threw a ball into the air from the top of a building. The height of the ball, in feet, is modeled by the equation $h = -16t^2 + 64t + 60$, where $t$ is the elapsed time, in seconds. Graph this equation on the set of axes below.
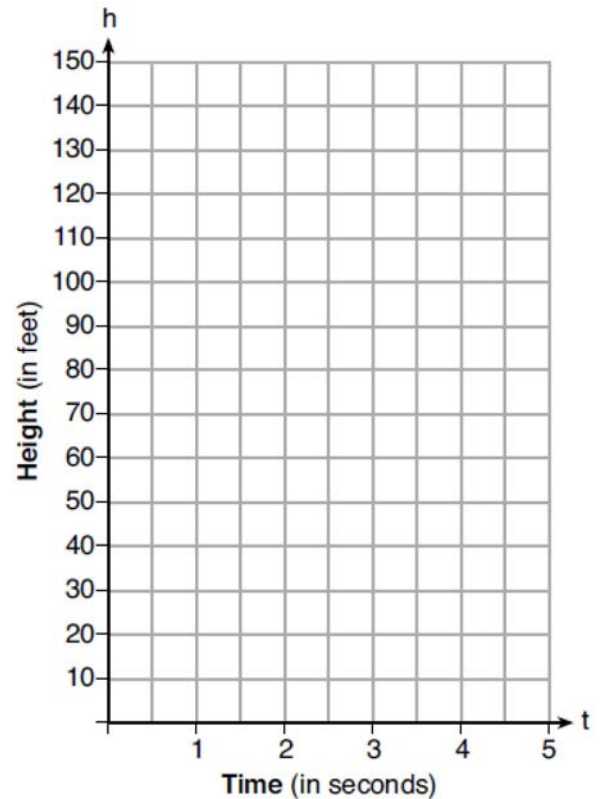
Determine the average rate of change, in feet per second, from when Michael released the ball to when the ball reached its maximum height.

133

724  The heights, in feet, of former New York Knicks basketball players are listed below.

6.4 6.9 6.3 6.2 6.3 6.0 6.1 6.3 6.8 6.2
6.5 7.1 6.4 6.3 6.5 6.5 6.4 7.0 6.4 6.3
6.2 6.3 7.0 6.4 6.5 6.5 6.5 6.0 6.2

Using the heights given, complete the frequency table below.

| Interval | Frequency |
|----------|-----------|
| 6.0-6.1 | |
| 6.2-6.3 | |
| 6.4-6.5 | |
| 6.6-6.7 | |
| 6.8-6.9 | |
| 7.0-7.1 | |

Based on the frequency table created, draw and label a frequency histogram on the grid below.
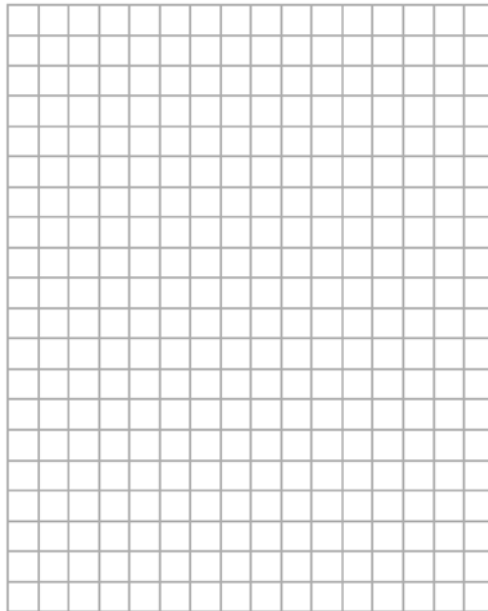
Determine and state which interval contains the upper quartile.  Justify your response.

725 The sum of two numbers, $x$ and $y$, is more than 8. When you double $x$ and add it to $y$, the sum is less than 14. Graph the inequalities that represent this scenario on the set of axes below.
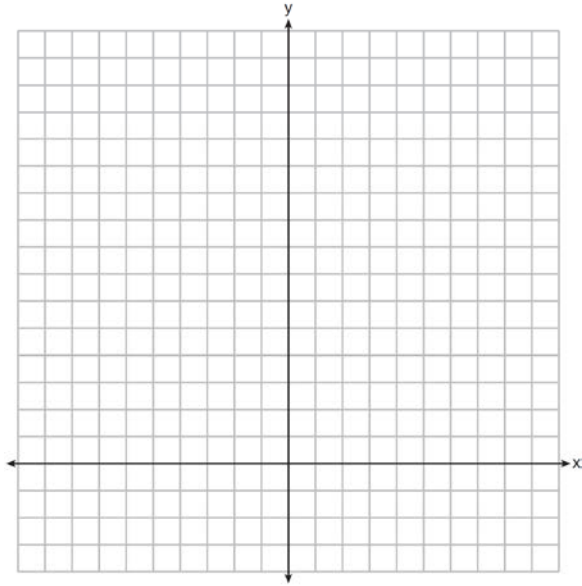


Kai says that the point $(6,2)$ is a solution to this system. Determine if he is correct and explain your reasoning.

726 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost $12 at the door and $8.50 if purchased in advance. The drama club has a goal of selling at least $1000 worth of tickets to Saturday's show. Write a system of inequalities that can be used to model this scenario. If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

727 Paul plans to have a rectangular garden adjacent to his garage. He will use 36 feet of fence to enclose three sides of the garden. The area of the garden, in square feet, can be modeled by $f(w) = w(36 - 2w)$, where $w$ is the width in feet. On the set of axes below, sketch the graph of $f(w)$.
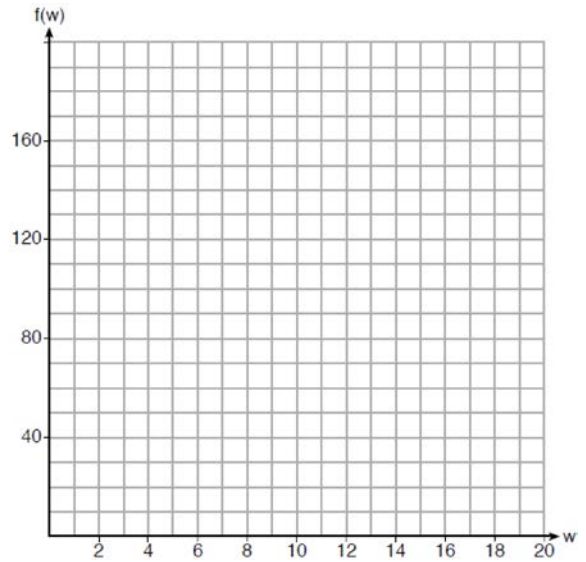


Explain the meaning of the vertex in the context of the problem.

728 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.
a) State two different methods Fred could use to solve the equation $f(x) = 0$.
b) Using one of the methods stated in part $a$, solve $f(x) = 0$ for $x$, to the *nearest tenth*.

729 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after $t$ seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer. State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

135

730 Graph $f(x) = |x|$ and $g(x) = -x^2 + 6$ on the grid below. Does $f(-2) = g(-2)$? Use your graph to explain why or why not.
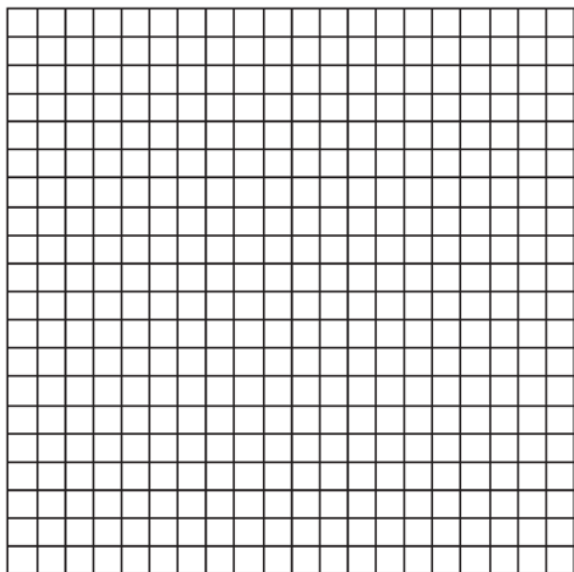
732 Let $f(x) = -2x^2$ and $g(x) = 2x - 4$. On the set of axes below, draw the graphs of $y = f(x)$ and $y = g(x)$.

Using this graph, determine and state *all* values of $x$ for which $f(x) = g(x)$.

731 Max purchased a box of green tea mints. The nutrition label on the box stated that a serving of three mints contains a total of 10 Calories. On the axes below, graph the function, $C$, where $C(x)$ represents the number of Calories in $x$ mints.

Write an equation that represents $C(x)$. A full box of mints contains 180 Calories. Use the equation to determine the total number of mints in the box.

733 a) Given the function $f(x) = -x^2 + 8x + 9$, state whether the vertex represents a maximum or minimum point for the function. Explain your answer.
b) Rewrite $f(x)$ in vertex form by completing the square.

136

734 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

|  | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 |
|---|---|---|---|---|---|---|---|---|---|
| High Temperature, t | 54 | 50 | 62 | 67 | 70 | 58 | 52 | 46 | 48 |
| Coffee Sales, f(t) | $2900 | $3080 | $2500 | $2380 | $2200 | $2700 | $3000 | $3620 | $3720 |

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of $t$. Round all values to the *nearest integer*. State the correlation coefficient, $r$, of the data to the *nearest hundredth*. Does $r$ indicate a strong linear relationship between the variables? Explain your reasoning.

735 On the axes below, graph $f(x) = |3x|$.
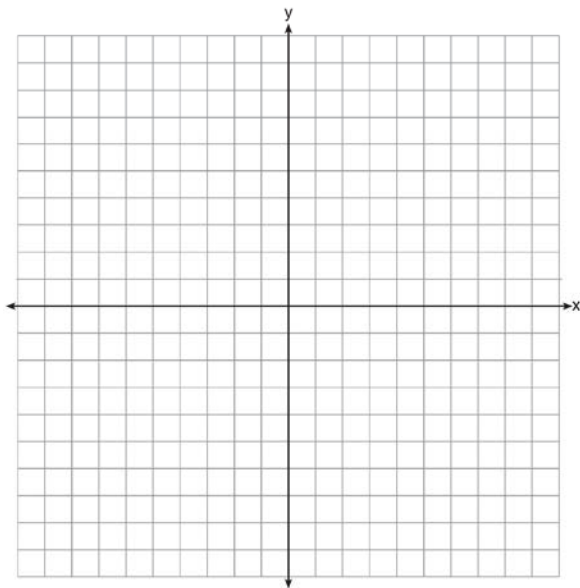


If $g(x) = f(x) - 2$, how is the graph of $f(x)$ translated to form the graph of $g(x)$? If $h(x) = f(x - 4)$, how is the graph of $f(x)$ translated to form the graph of $h(x)$?

736 One spring day, Elroy noted the time of day and the temperature, in degrees Fahrenheit. His findings are stated below.

At 6 a.m., the temperature was 50°F. For the next 4 hours, the temperature rose 3° per hour. The next 6 hours, it rose 2° per hour. The temperature then stayed steady until 6 p.m. For the next 2 hours, the temperature dropped 1° per hour. The temperature then dropped steadily until the temperature was 56°F at midnight.

On the set of axes below, graph Elroy's data.
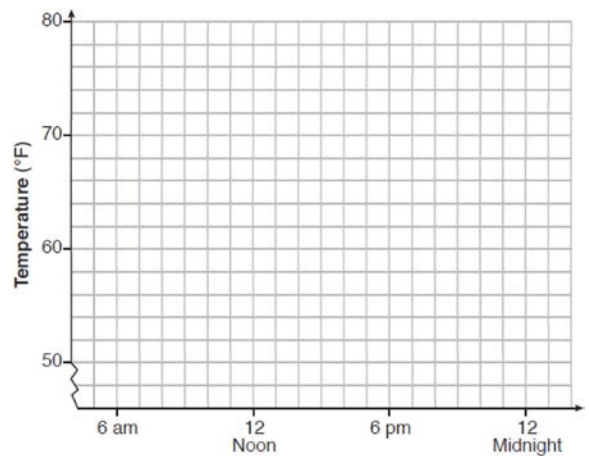


State the entire time interval for which the temperature was increasing. Determine the average rate of change, in degrees per hour, from 6:00 p.m. to midnight.

137

737 A snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour. The snow then started to fall at an average rate of one inch per hour for the next 6 hours. Then it stopped snowing for 3 hours. Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over. On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Elapsed Time (in hours)
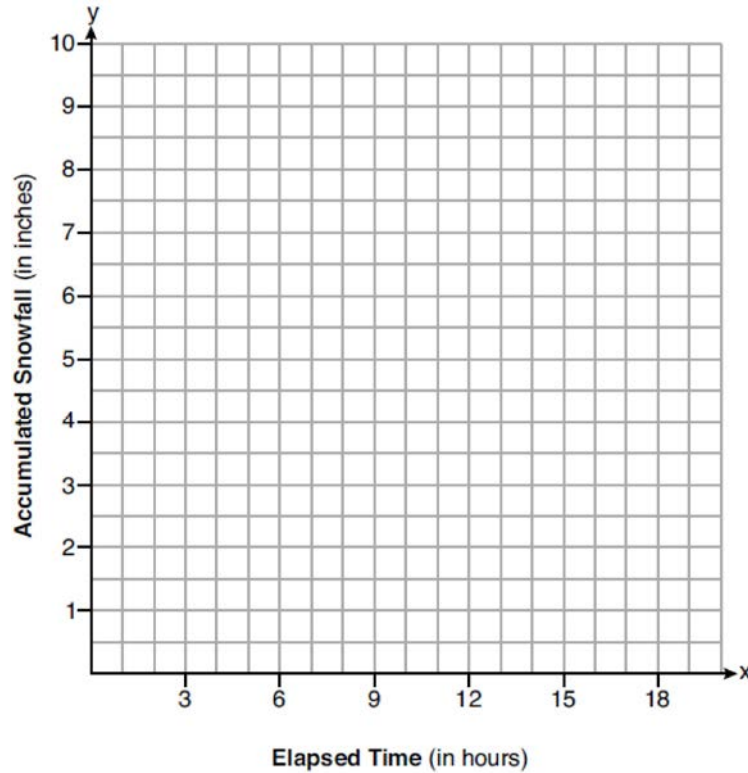
Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

738 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

| Distance From Times Square (city blocks) (x) | 0 | 0 | 1 | 1 | 3 | 4 | 7 | 11 | 14 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cost of a Room (dollars) (y) | 293 | 263 | 244 | 224 | 185 | 170 | 219 | 153 | 136 | 111 |

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*. State the correlation coefficient for this data set, to the *nearest hundredth*. Explain what the sign of the correlation coefficient suggests in the context of the problem.

739 On the set of axes below, graph the following system of inequalities:
$$2y + 3x \le 14$$
$$4x - y < 2$$
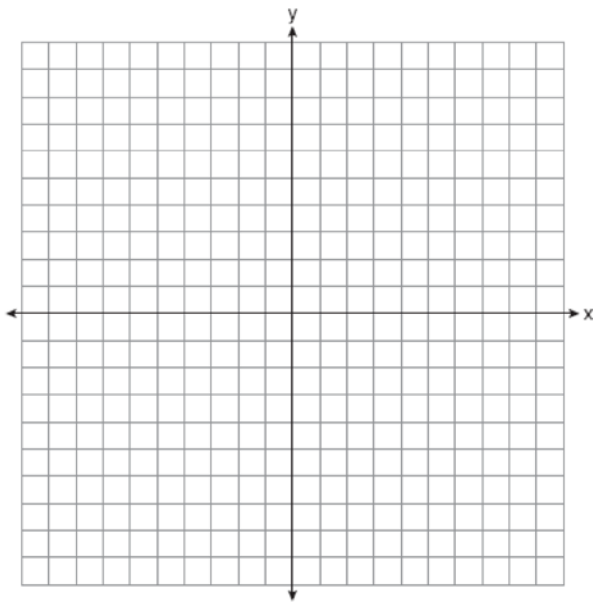


Determine if the point $(1, 2)$ is in the solution set. Explain your answer.

740 The graph below models the height of Sam's kite over a period of time.
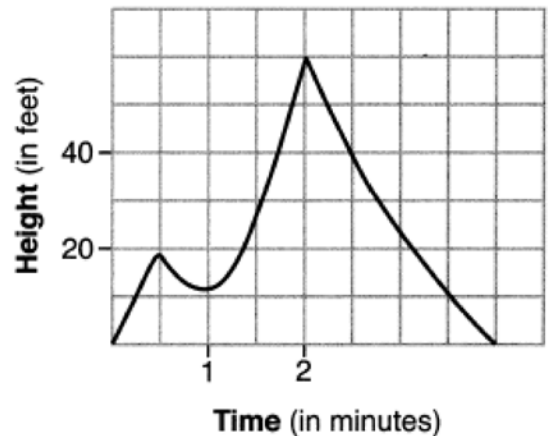


Explain what the zeros of the graph represent in the context of the situation. State the time intervals over which the height of the kite is increasing. State the maximum height, in feet, that the kite reaches.

741 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$. Solve for $x$ when $m(x) = 0$.

742  Thomas took a 140-mile bus trip to visit his grandparents. His trip is outlined on the graph below.
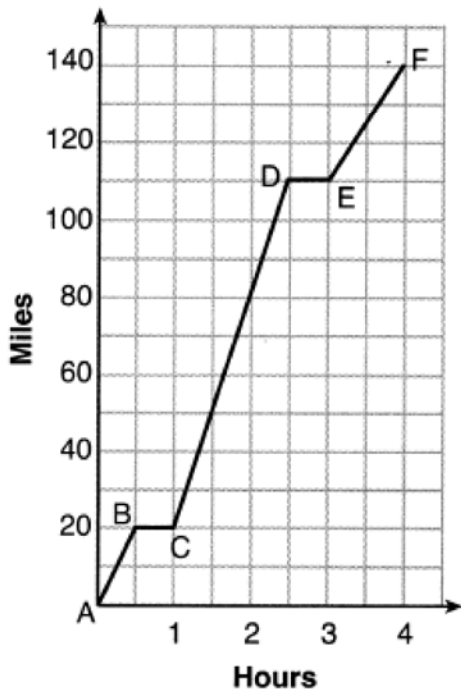


Explain what might have happened in the interval between *D* and *E*. State the interval in which the bus traveled the fastest. State how many miles per hour the bus was traveling during this interval. What was the average rate of speed, in miles per hour, for Thomas' entire bus trip?

743  During a snowstorm, a meteorologist tracks the amount of accumulating snow. For the first three hours of the storm, the snow fell at a constant rate of one inch per hour. The storm then stopped for two hours and then started again at a constant rate of one-half inch per hour for the next four hours.
a) On the grid below, draw and label a graph that models the accumulation of snow over time using the data the meteorologist collected.
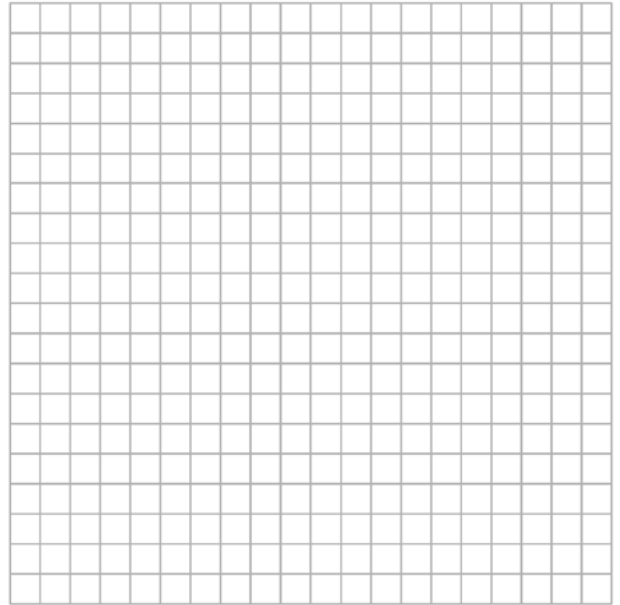


b) If the snowstorm started at 6 p.m., how much snow had accumulated by midnight?

140

744 Use the data below to write the regression equation $(y = ax + b)$ for the raw test score based on the hours tutored. Round all values to the *nearest hundredth*.

| Tutor Hours, x | Raw Test Score | Residual (Actual-Predicted) |
|---|---|---|
| 1 | 30 | 1.3 |
| 2 | 37 | 1.9 |
| 3 | 35 | −6.4 |
| 4 | 47 | −0.7 |
| 5 | 56 | 2.0 |
| 6 | 67 | 6.6 |
| 7 | 62 | −4.7 |

Equation: _____

Create a residual plot on the axes below, using the residual scores in the table above.
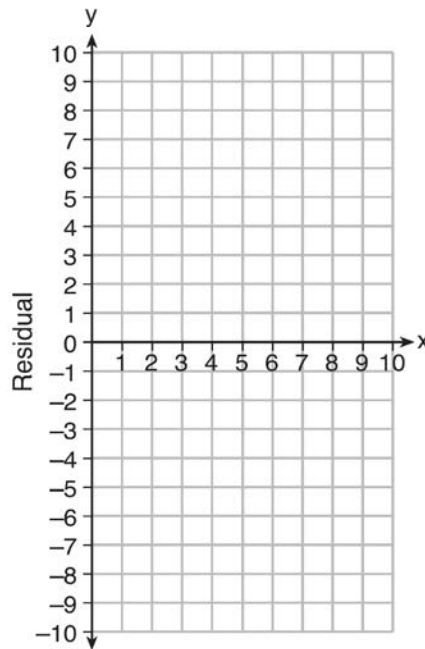


Based on the residual plot, state whether the equation is a good fit for the data. Justify your answer.

745 At an office supply store, if a customer purchases fewer than 10 pencils, the cost of each pencil is $1.75. If a customer purchases 10 or more pencils, the cost of each pencil is $1.25. Let $c$ be a function for which $c(x)$ is the cost of purchasing $x$ pencils, where $x$ is a whole number.

$$c(x) = \begin{cases} 1.75x, & \text{if } 0 \le x \le 9 \\ 1.25x, & \text{if } x \ge 10 \end{cases}$$

Create a graph of $c$ on the axes below.
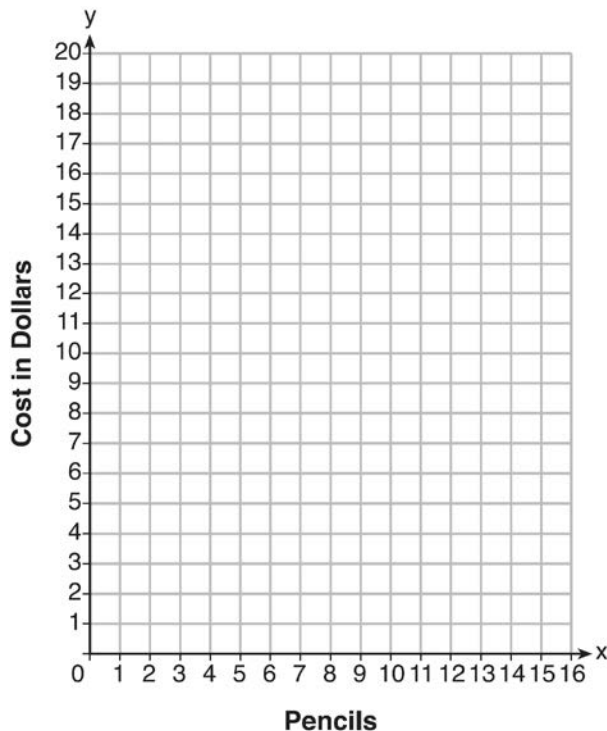


Pencils

A customer brings 8 pencils to the cashier. The cashier suggests that the total cost to purchase 10 pencils would be less expensive. State whether the cashier is correct or incorrect. Justify your answer.

746 An insurance agent is looking at records to determine if there is a relationship between a driver's age and percentage of accidents caused by speeding. The table below shows his data.

| Age ($x$) | 17 | 18 | 21 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentage of Accidents Caused by Speeding ($y$) | 49 | 49 | 48 | 38 | 31 | 33 | 24 | 25 | 16 | 10 | 5 | 6 |

State the linear regression equation that models the relationship between the driver's age, $x$, and the percentage of accidents caused by speeding, $y$. Round all values to the *nearest hundredth*. State the value of the correlation coefficient to the *nearest hundredth*. Explain what this means in the context of the problem.

747 Shawn incorrectly graphed the inequality
$-x - 2y \geq 8$ as shown below.
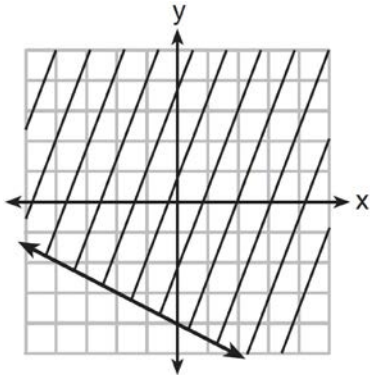


Explain Shawn's mistake. Graph the inequality
correctly on the set of axes below.
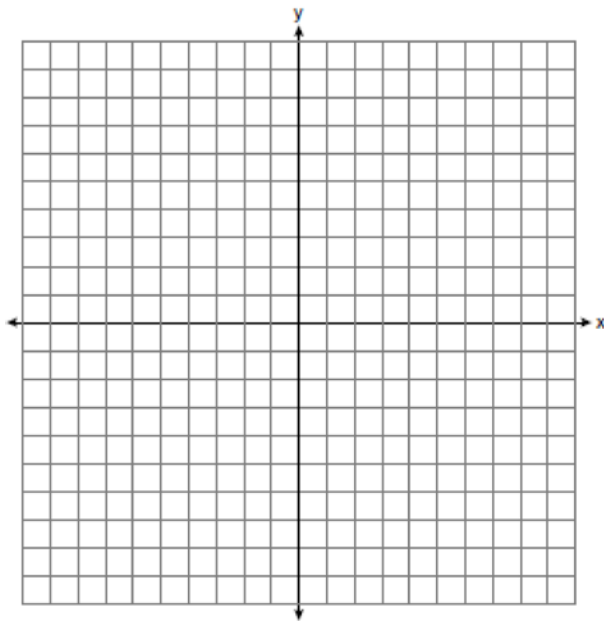


748 Graph the following systems of inequalities on the
set of axes below:

$$2y \geq 3x - 16$$

$$y + 2x > -5$$
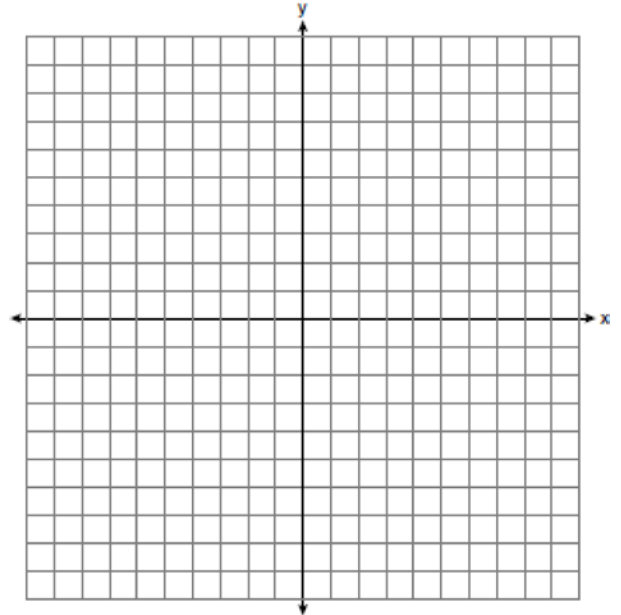


Based upon your graph, explain why $(6,1)$ is a
solution to this system and why $(-6,7)$ is *not* a
solution to this system.

749 Sarah wants to buy a snowboard that has a total
cost of $580, including tax. She has already saved
$135 for it. At the end of each week, she is paid
$96 for babysitting and is going to save
three-quarters of that for the snowboard. Write an
inequality that can be used to determine the
minimum number of weeks Sarah needs to babysit
to have enough money to purchase the snowboard.
Determine and state the minimum number of full
weeks Sarah needs to babysit to have enough
money to purchase this snowboard.

750 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

| Median Diameter of Grains of Sand, in Millimeters ($x$) | 0.17 | 0.19 | 0.22 | 0.235 | 0.235 | 0.3 | 0.35 | 0.42 | 0.85 |
|---|---|---|---|---|---|---|---|---|---|
| Slope of Beach, in Degrees ($y$) | 0.63 | 0.7 | 0.82 | 0.88 | 1.15 | 1.5 | 4.4 | 7.3 | 11.3 |

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*. Using this equation, predict the slope of a beach, to the *nearest tenth of a degree*, on a beach with grains of sand having a median diameter of 0.65 mm.

751 Solve the system of inequalities graphically on the set of axes below. Label the solution set *S*.

$$y + 3x < 5$$

$$1 \geq 2x - y$$
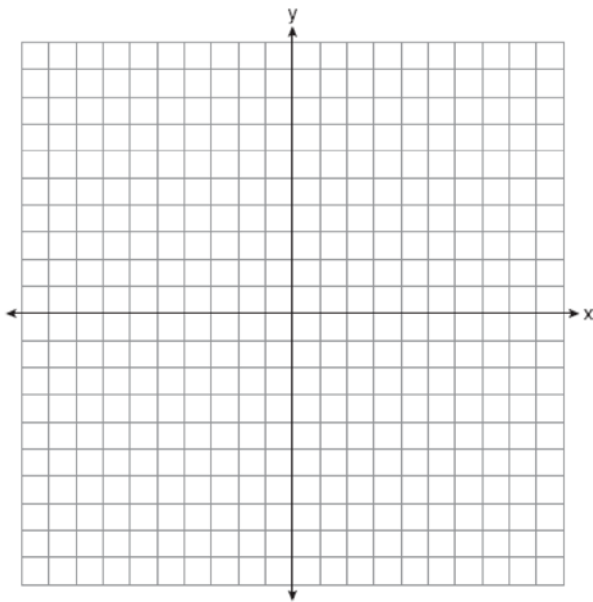
Is the point $(-5, 0)$ in the solution set? Explain your answer.

752 There are two parking garages in Beacon Falls. Garage *A* charges $7.00 to park for the first 2 hours, and each additional hour costs $3.00. Garage *B* charges $3.25 per hour to park. When a person parks for at least 2 hours, write equations to model the cost of parking for a total of *x* hours in Garage *A* and Garage *B*. Determine algebraically the number of hours when the cost of parking at both garages will be the same.

753 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for $2 each and bottles of water sell for $1.50 each. The club needs to raise at least $500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles. Write a system of inequalities that can be used to represent this situation. The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

754  A system of inequalities is graphed on the set of axes below.
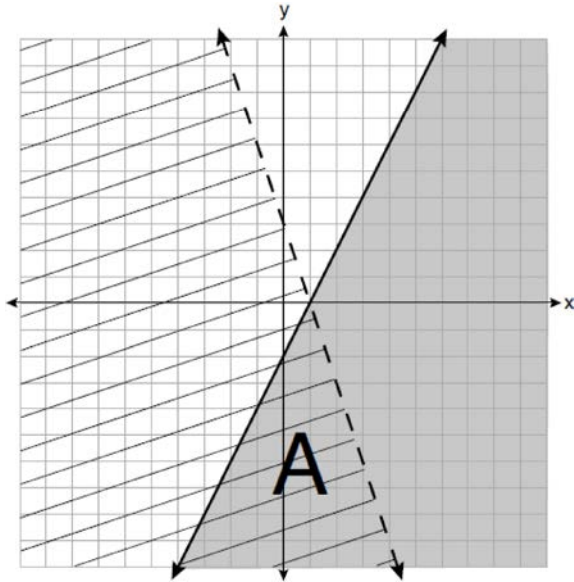


State the system of inequalities represented by the graph. State what region *A* represents. State what the entire gray region represents.

755  The equation to determine the weekly earnings of an employee at The Hamburger Shack is given by $w(x)$, where $x$ is the number of hours worked.

$$w(x) = \begin{cases} 10x, & 0 \le x \le 40 \\ 15(x - 40) + 400, & x > 40 \end{cases}$$

Determine the difference in salary, *in dollars*, for an employee who works 52 hours versus one who works 38 hours. Determine the number of hours an employee must work in order to earn $445. Explain how you arrived at this answer.

756  An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function $h(t) = -16t^2 + 128t + 9000$ models the height, in feet, of the pilot above the ground, where $t$ is the time, in seconds, after she is ejected from the aircraft. Determine and state the vertex of $h(t)$. Explain what the second coordinate of the vertex represents in the context of the problem. After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

757  Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

| Number of Knots | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|
| Length of Rope (cm) | 64 | 58 | 49 | 39 | 31 |

State, to the *nearest tenth*, the linear regression equation that approximates the length, *y*, of the rope after tying *x* knots. Explain what the *y*-intercept means in the context of the problem. Explain what the slope means in the context of the problem.

758 The table below shows the number of hours ten students spent studying for a test and their scores.

| Hours Spent Studying ($x$) | 0 | 1 | 2 | 4 | 4 | 4 | 6 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Scores ($y$) | 35 | 40 | 46 | 65 | 67 | 70 | 82 | 88 | 82 | 95 |

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*. State the correlation coefficient of this line, to the *nearest hundredth*. Explain what the correlation coefficient suggests in the context of the problem.

759 Solve the system of inequalities graphically on the set of axes below. Label the solution set $S$.
$$2x + 3y < 9$$
$$2y \geq 4x + 6$$
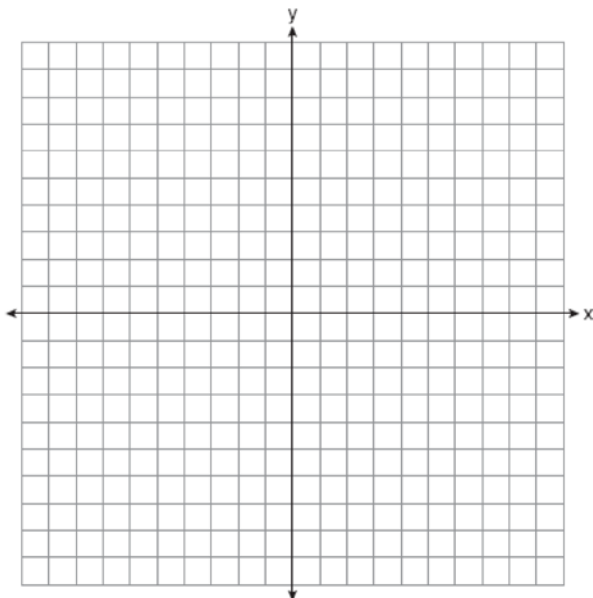


Determine if the point $(0,3)$ is a solution to this system of inequalities. Justify your answer.

760 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.



The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*. State the entire interval for which the number of pairs of shoes sold is increasing. Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

761 Marilyn collects old dolls. She purchases a doll for $450. Research shows this doll's value will increase by 2.5% each year. Write an equation that determines the value, $V$, of the doll $t$ years after purchase. Assuming the doll's rate of appreciation remains the same, will the doll's value be doubled in 20 years? Justify your reasoning.

762 Graph the system of inequalities on the set of axes below:

$$y \le -\frac{3}{4}x + 5$$

$$3x - 2y > 4$$
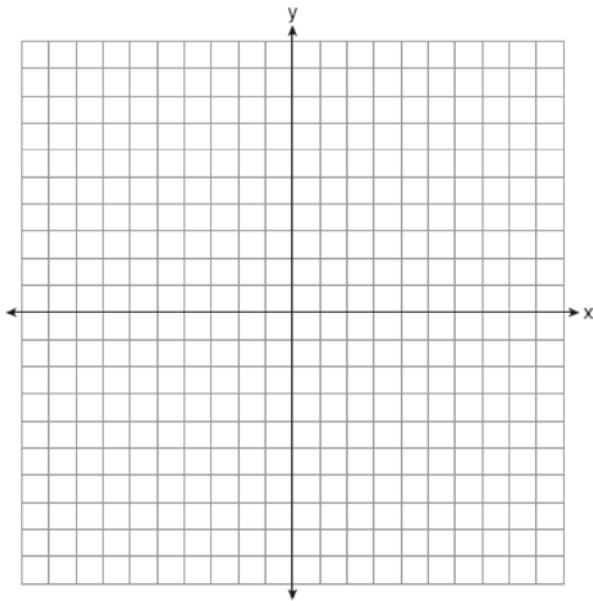


Is $(6,3)$ a solution to the system of inequalities? Explain your answer.

763 A ball is projected up into the air from the surface of a platform to the ground below. The height of the ball above the ground, in feet, is modeled by the function $f(t) = -16t^2 + 96t + 112$, where $t$ is the time, in seconds, after the ball is projected. State the height of the platform, in feet. State the coordinates of the vertex. Explain what it means in the context of the problem. State the entire interval over which the ball's height is *decreasing*.

764 Solve the following system of inequalities graphically on the grid below and label the solution $S$.

$$3x + 4y > 20$$

$$x < 3y - 18$$
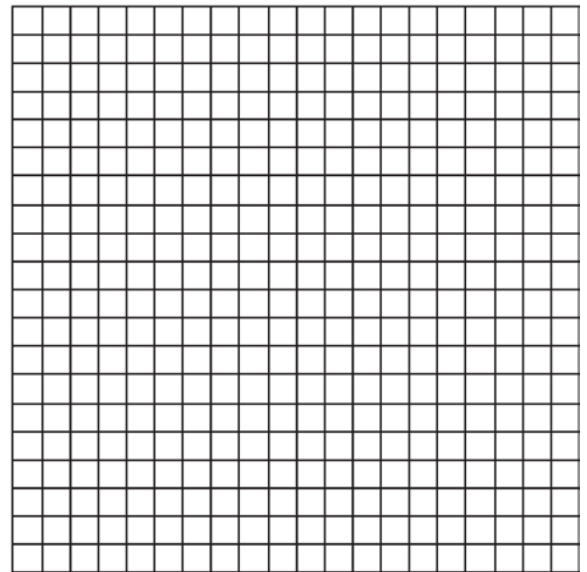


Is the point $(3,7)$ in the solution set? Explain your answer.

765 Graph $f(x)$ and $g(x)$ on the set of axes below.

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

$$g(x) = \frac{1}{2}x + 1$$
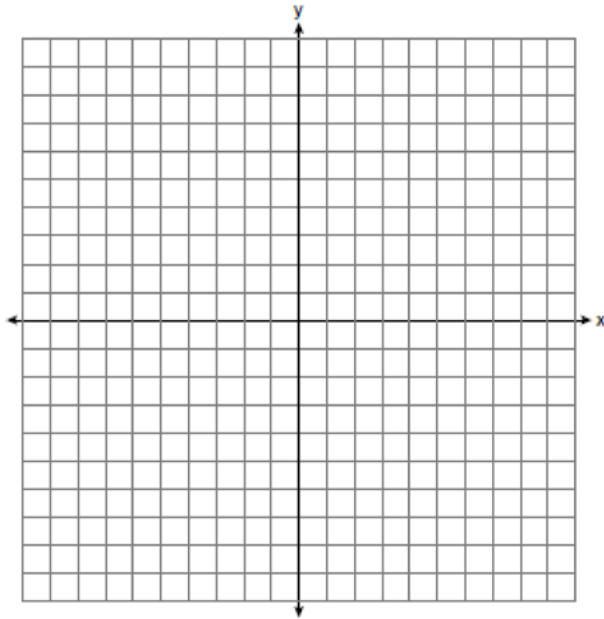
Based on your graph, state *one* value of $x$ that satisfies $f(x) = g(x)$. Explain your reasoning.

766 The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving.
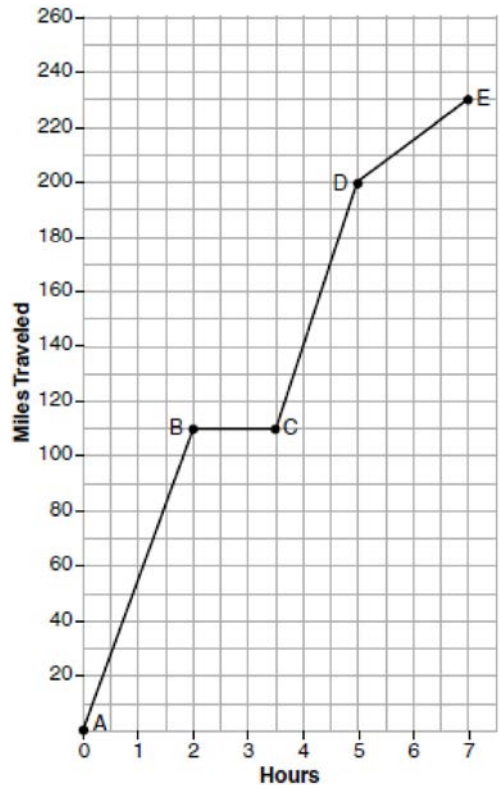
Based on the graph, during which interval did Craig most likely drive in the city? Explain your reasoning. Explain what might have happened in the interval between $B$ and $C$. Determine Craig's average speed, to the *nearest tenth of a mile per hour*, for his entire trip.

767 The table below shows the attendance at a museum in select years from 2007 to 2013.

| Attendance at Museum | | | | | |
|---|---|---|---|---|---|
| Year | 2007 | 2008 | 2009 | 2011 | 2013 |
| Attendance (millions) | 8.3 | 8.5 | 8.5 | 8.8 | 9.3 |

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and $y$ is used to represent the attendance. Round all values to the *nearest hundredth*. State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

768 The percentage of students scoring 85 or better on a mathematics final exam and an English final exam during a recent school year for seven schools is shown in the table below.

| Percentage of Students Scoring 85 or Better | |
| --- | --- |
| Mathematics, x | English, y |
| 27 | 46 |
| 12 | 28 |
| 13 | 45 |
| 10 | 34 |
| 30 | 56 |
| 45 | 67 |
| 20 | 42 |

Write the linear regression equation for these data, rounding all values to the *nearest hundredth*. State the correlation coefficient of the linear regression equation, to the *nearest hundredth*. Explain the meaning of this value in the context of these data.

769 Caitlin has a movie rental card worth $175. After she rents the first movie, the card's value is $172.25. After she rents the second movie, its value is $169.50. After she rents the third movie, the card is worth $166.75. Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after $n$ rentals. Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

770 The height, $H$, in feet, of an object dropped from the top of a building after $t$ seconds is given by $H(t) = -16t^2 + 144$. How many feet did the object fall between one and two seconds after it was dropped? Determine, algebraically, how many seconds it will take for the object to reach the ground.

771 The data given in the table below show some of the results of a study comparing the height of a certain breed of dog, based upon its mass.

| Mass (kg) | 4.5 | 5 | 4 | 3.5 | 5.5 | 5 | 5 | 4 | 4 | 6 | 3.5 | 5.5 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Height (cm) | 41 | 40 | 35 | 38 | 43 | 44 | 37 | 39 | 42 | 44 | 31 | 30 |

Write the linear regression equation for these data, where $x$ is the mass and $y$ is the height. Round all values to the *nearest tenth*. State the value of the correlation coefficient to the *nearest tenth*, and explain what it indicates.

772  Michael has $10 in his savings account. Option 1 will add $100 to his account each week. Option 2 will double the amount in his account at the end of each week. Write a function in terms of $x$ to model each option of saving. Michael wants to have at least $700 in his account at the end of 7 weeks to buy a mountain bike. Determine which option(s) will enable him to reach his goal. Justify your answer.

773  A store sells grapes for $1.99 per pound, strawberries for $2.50 per pound, and pineapples for $2.99 each. Jonathan has $25 to buy fruit. He plans to buy 2 more pounds of strawberries than grapes. He also plans to buy 2 pineapples. If $x$ represents the number of pounds of grapes, write an inequality in one variable that models this scenario. Determine algebraically the maximum number of whole pounds of grapes he can buy.

774  Joey recorded his heart rate, in beats per minute (bpm), after doing different numbers of jumping jacks. His results are shown in the table below.

| Number of Jumping Jacks x | Heart Rate (bpm) y |
|---|---|
| 0 | 68 |
| 10 | 84 |
| 15 | 104 |
| 20 | 100 |
| 30 | 120 |

State the linear regression equation that estimates the heart rate per number of jumping jacks. State the correlation coefficient of the linear regression equation, rounded to the *nearest hundredth*. Explain what the correlation coefficient suggests in the context of this problem.

775  Albert says that the two systems of equations shown below have the same solutions.

| First System | Second System |
|---|---|
| $8x + 9y = 48$ | $8x + 9y = 48$ |
| $12x + 5y = 21$ | $-8.5y = -51$ |

Determine and state whether you agree with Albert. Justify your answer.

776 Graph the system of inequalities:
$$-x + 2y - 4 < 0$$
$$3x + 4y + 4 \geq 0$$
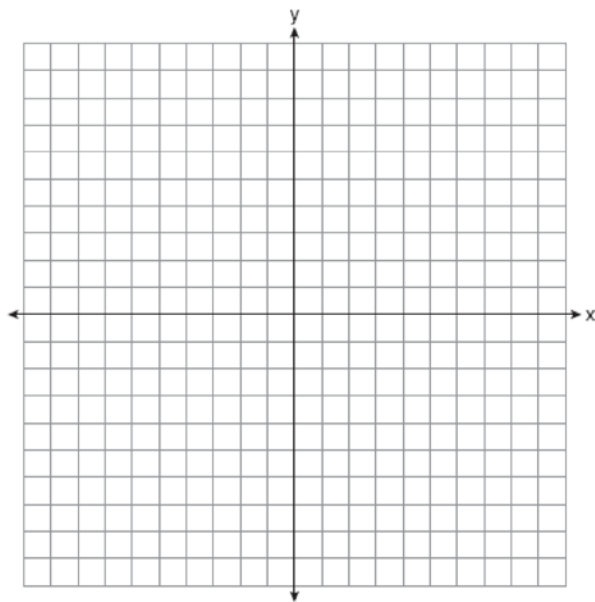
Stephen says the point $(0,0)$ is a solution to this system. Determine if he is correct, and explain your reasoning.

777 On the set of axes below, graph $f(x) = x^2 - 1$ and $g(x) = 3^x$.
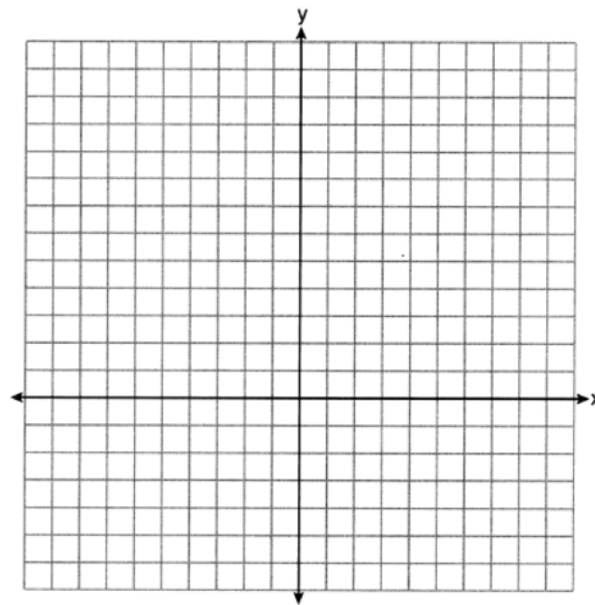
Based on your graph, for how many values of $x$ does $f(x) = g(x)$? Explain your reasoning.

## Algebra 1 6 Point Regents Exam Questions

1   New Clarendon Park is undergoing renovations to its gardens. One garden that was originally a square is being adjusted so that one side is doubled in length, while the other side is decreased by three meters. The new rectangular garden will have an area that is 25% more than the original square garden. Write an equation that could be used to determine the length of a side of the original square garden. Explain how your equation models the situation. Determine the area, in square meters, of the new rectangular garden.

2   A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width. Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create. Explain how your equation or inequality models the situation. Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

3   At a local garden shop, the price of plants includes sales tax. The cost of 4 large plants and 8 medium plants is $40. The cost of 5 large plants and 2 medium plants is $28. If *l* is the cost of a large plant and *m* is the cost of a medium plant, write a system of equations that models this situation. Could the cost of one large plant be $5.50 and the cost of one medium plant be $2.25? Justify your answer. Determine algebraically both the cost of a large plant and the cost of a medium plant.

4   Franco and Caryl went to a bakery to buy desserts. Franco bought 3 packages of cupcakes and 2 packages of brownies for $19. Caryl bought 2 packages of cupcakes and 4 packages of brownies for $24. Let *x* equal the price of one package of cupcakes and *y* equal the price of one package of brownies. Write a system of equations that describes the given situation. On the set of axes below, graph the system of equations.
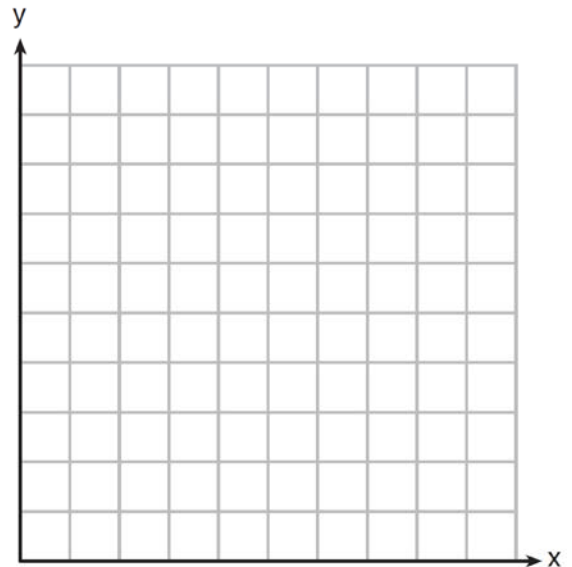


Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution.

152

5   At the present time, Mrs. Bee's age is six years more than four times her son's age.  Three years ago, she was seven times as old as her son was then.  If $b$ represents Mrs. Bee's age now and $s$ represents her son's age now, write a system of equations that could be used to model this scenario.  Use this system of equations to determine, algebraically, the ages of both Mrs. Bee and her son now.  Determine how many years from now Mrs. Bee will be three times as old as her son will be then.

6   A local business was looking to hire a landscaper to work on their property.  They narrowed their choices to two companies.  Flourish Landscaping Company charges a flat rate of $120 per hour.  Green Thumb Landscapers charges $70 per hour plus a $1600 equipment fee.  Write a system of equations representing how much each company charges.  Determine and state the number of hours that must be worked for the cost of each company to be the same. [The use of the grid below is optional.]  If it is estimated to take at least 35 hours to complete the job, which company will be less expensive?  Justify your answer.
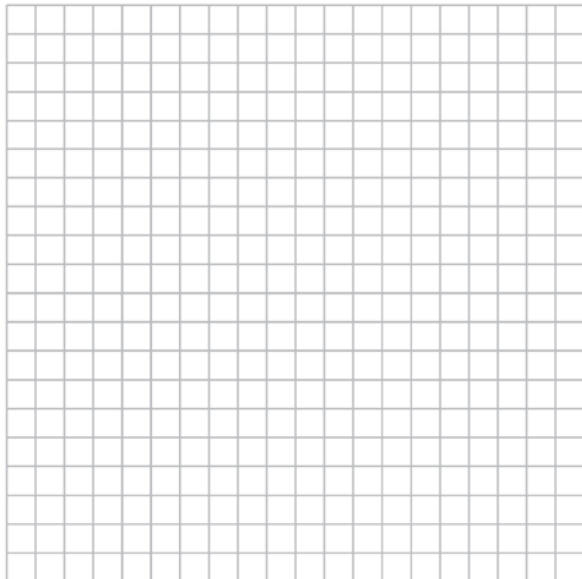
7   A company is considering building a manufacturing plant.  They determine the weekly production cost at site $A$ to be $A(x) = 3x^2$ while the production cost at site $B$ is $B(x) = 8x + 3$, where $x$ represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*.  Graph the production cost functions on the set of axes below and label them site $A$ and site $B$.
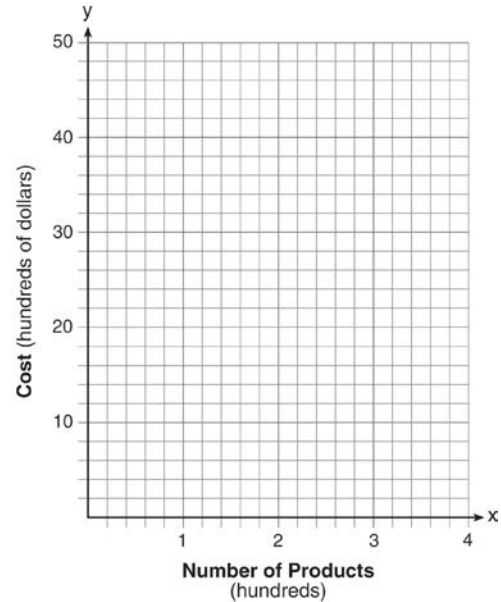
State the positive value(s) of $x$ for which the production costs at the two sites are equal.  Explain how you determined your answer.  If the company plans on manufacturing 200 products per week, which site should they use?  Justify your answer.

153

8 Dylan has a bank that sorts coins as they are dropped into it. A panel on the front displays the total number of coins inside as well as the total value of these coins. The panel shows 90 coins with a value of $17.55 inside of the bank. If Dylan only collects dimes and quarters, write a system of equations in two variables or an equation in one variable that could be used to model this situation. Using your equation or system of equations, algebraically determine the number of quarters Dylan has in his bank. Dylan's mom told him that she would replace each one of his dimes with a quarter. If he uses all of his coins, determine if Dylan would then have enough money to buy a game priced at $20.98 if he must also pay an 8% sales tax. Justify your answer.

9 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent $19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent $15.76. Write a system of equations to represent the costs of a juice box, $j$, and a bottle of water, $w$. Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible. Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

10 At an amusement park, the cost for an adult admission is $a$, and for a child the cost is $c$. For a group of six that included two children, the cost was $325.94. For a group of five that included three children, the cost was $256.95. All ticket prices include tax. Write a system of equations, in terms of $a$ and $c$, that models this situation. Use your system of equations to determine the exact cost of each type of ticket algebraically. Determine the cost for a group of four that includes three children.

11 Two families went to Rollercoaster World. The Brown family paid $170 for 3 children and 2 adults. The Peckham family paid $360 for 4 children and 6 adults. If $x$ is the price of a child's ticket in dollars and $y$ is the price of an adult's ticket in dollars, write a system of equations that models this situation. Graph your system of equations on the set of axes below.
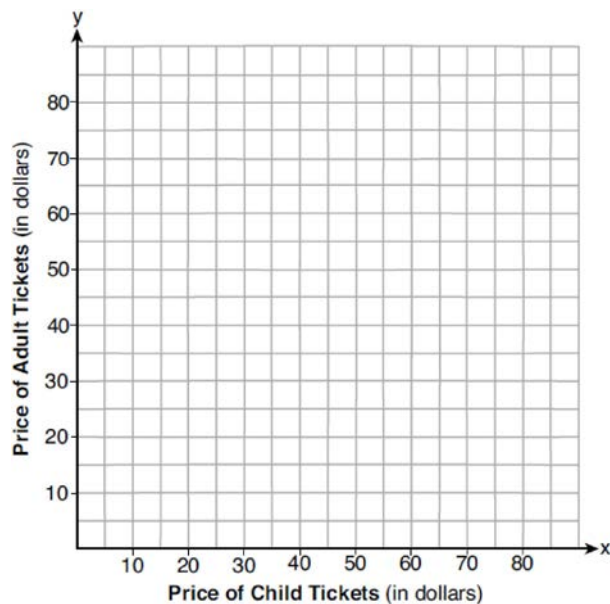


State the coordinates of the point of intersection. Explain what each coordinate of the point of intersection means in the context of the problem.

154

12 A recreation center ordered a total of 15 tricycles and bicycles from a sporting goods store. The number of wheels for all the tricycles and bicycles totaled 38. Write a linear system of equations that models this scenario, where $t$ represents the number of tricycles and $b$ represents the number of bicycles ordered. On the set of axes below, graph this system of equations.
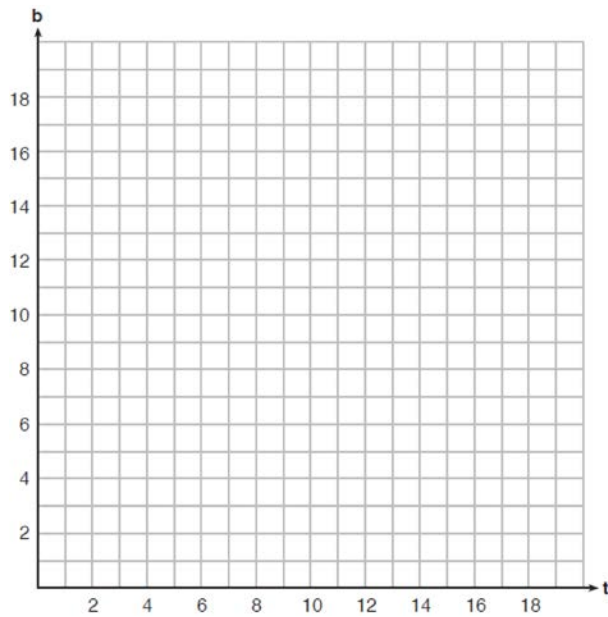


Based on your graph of this scenario, could the recreation center have ordered 10 tricycles? Explain your reasoning.

13 Next weekend Marnie wants to attend either carnival A or carnival B. Carnival A charges $6 for admission and an additional $1.50 per ride. Carnival B charges $2.50 for admission and an additional $2 per ride.
a) In function notation, write $A(x)$ to represent the total cost of attending carnival A and going on $x$ rides. In function notation, write $B(x)$ to represent the total cost of attending carnival B and going on $x$ rides.
b) Determine the number of rides Marnie can go on such that the total cost of attending each carnival is the same. [Use of the set of axes below is optional.]
c) Marnie wants to go on five rides. Determine which carnival would have the lower total cost. Justify your answer.
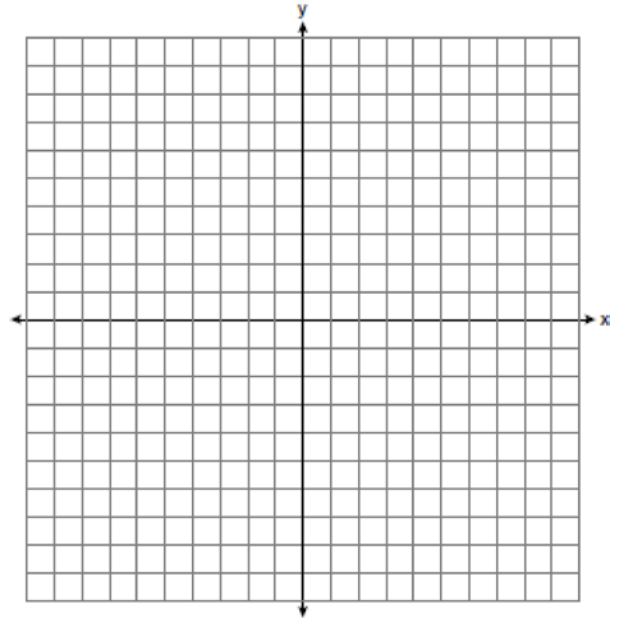
14 A football player attempts to kick a football over a goal post. The path of the football can be modeled by the function $h(x) = -\dfrac{1}{225} x^2 + \dfrac{2}{3} x$, where $x$ is the horizontal distance from the kick, and $h(x)$ is the height of the football above the ground, when both are measured in feet. On the set of axes below, graph the function $y = h(x)$ over the interval $0 \le x \le 150$.
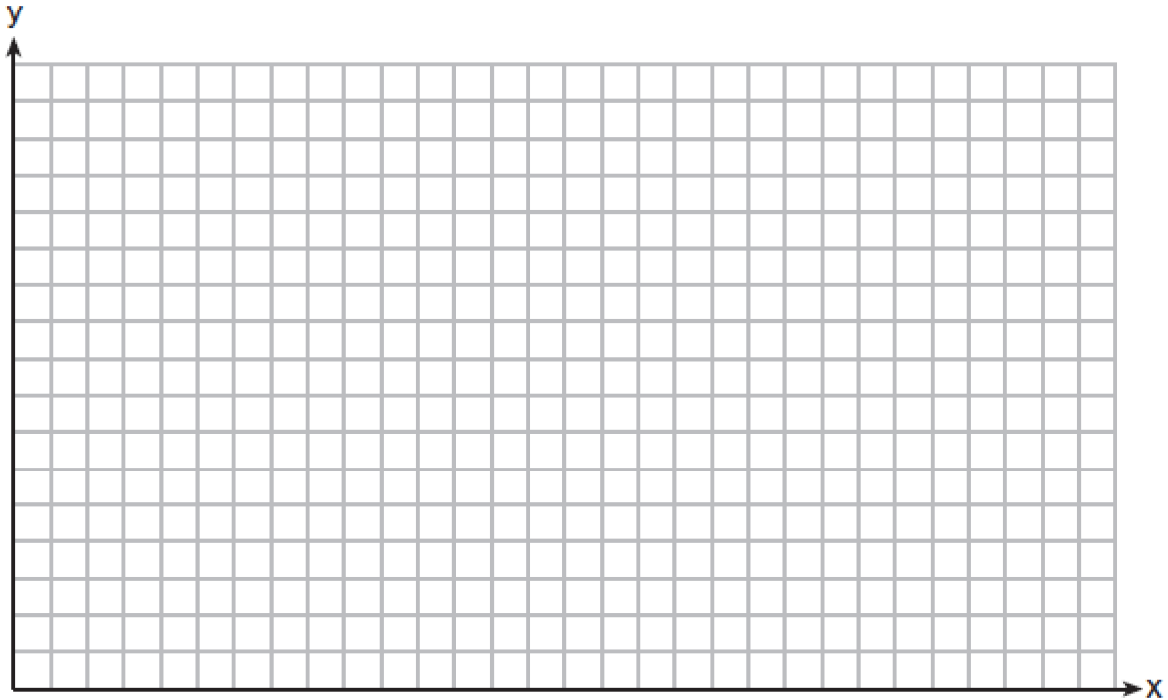


Determine the vertex of $y = h(x)$. Interpret the meaning of this vertex in the context of the problem. The goal post is 10 feet high and 45 yards away from the kick. Will the ball be high enough to pass over the goal post? Justify your answer.

15 At Bea's Pet Shop, the number of dogs, $d$, is initially five less than twice the number of cats, $c$. If she decides to add three more of each, the ratio of cats to dogs will be $\dfrac{3}{4}$. Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop. Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning. Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

16  Central High School had five members on their swim team in 2010.  Over the next several years, the team increased by an average of 10 members per year.  The same school had 35 members in their chorus in 2010.  The chorus saw an increase of 5 members per year.  Write a system of equations to model this situation, where $x$ represents the number of years since 2010.  Graph this system of equations on the set of axes below.
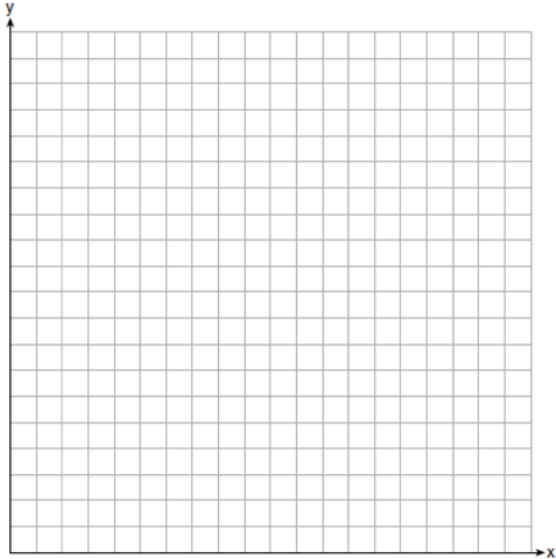
Explain in detail what each coordinate of the point of intersection of these equations means in the context of this problem.

17  Edith babysits for $x$ hours a week after school at a job that pays $4 an hour.  She has accepted a job that pays $8 an hour as a library assistant working $y$ hours a week.  She will work both jobs.  She is able to work *no more than* 15 hours a week, due to school commitments.  Edith wants to earn *at least* $80 a week, working a combination of both jobs.  Write a system of inequalities that can be used to represent the situation.  Graph these inequalities on the set of axes below.
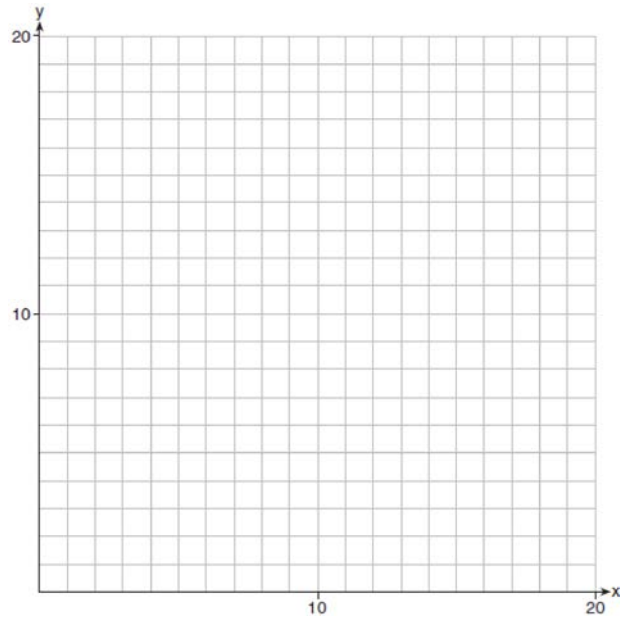
Determine and state one combination of hours that will allow Edith to earn *at least* $80 per week while working *no more than* 15 hours.

18  The Reel Good Cinema is conducting a mathematical study.  In its theater, there are 200 seats.  Adult tickets cost
    $12.50 and child tickets cost $6.25.  The cinema's goal is to sell at least $1500 worth of tickets for the theater.
    Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, $x$, and
    child tickets, $y$, that would satisfy the cinema's goal.  Graph the solution to this system of inequalities on the set of
    axes below.  Label the solution with an $S$.  Marta claims that selling 30 adult tickets and 80 child tickets will result
    in meeting the cinema's goal.  Explain whether she is correct or incorrect, based on the graph drawn.
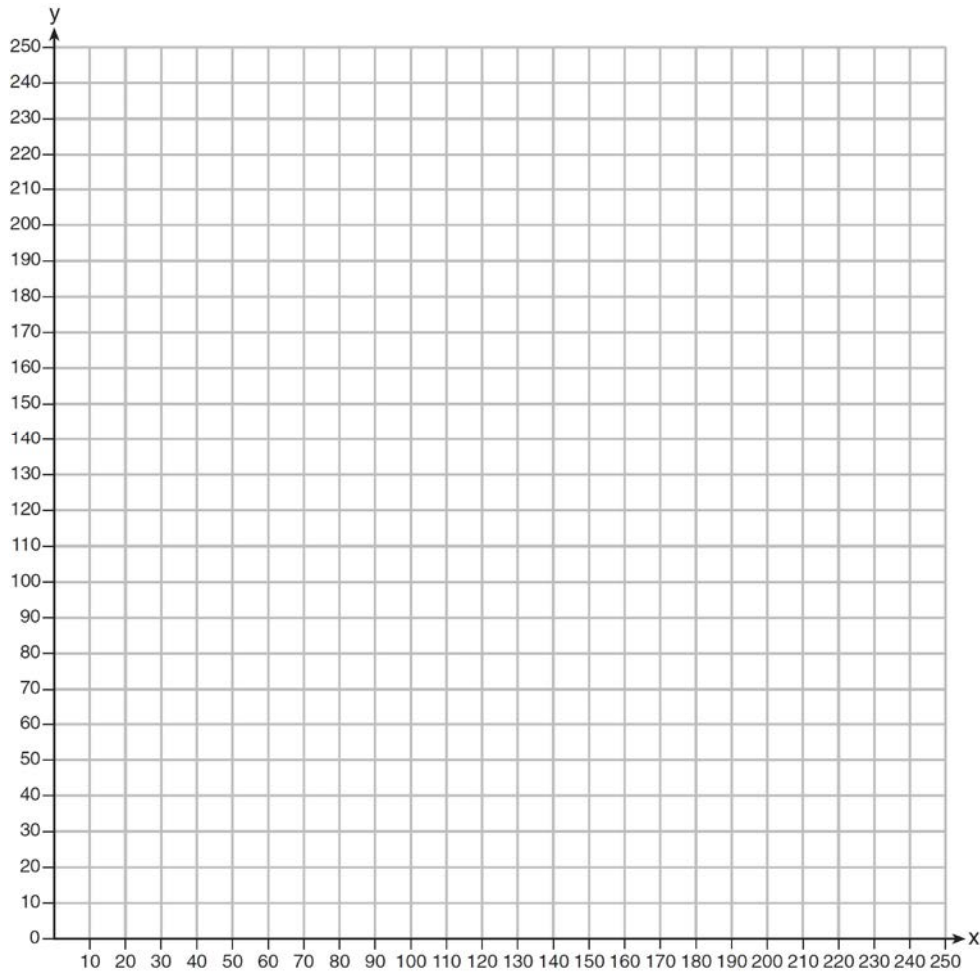
19  Ian is borrowing $1000 from his parents to buy a notebook computer.  He plans to pay them back at the rate of $60 per month.  Ken is borrowing $600 from his parents to purchase a snowboard.  He plans to pay his parents back at the rate of $20 per month.  Write an equation that can be used to determine after how many months the boys will owe the same amount.  Determine algebraically and state in how many months the two boys will owe the same amount.  State the amount they will owe at this time.  Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount.  Determine and state if Ian is correct.  Explain your reasoning.

20  An ice cream shop sells small and large sundaes.  One day, 30 small sundaes and 50 large sundaes were sold for $420.  Another day, 15 small sundaes and 35 large sundaes were sold for $270.  Sales tax is included in all prices.  If $x$ is the cost of a small sundae and $y$ is the cost of a large sundae, write a system of equations to represent this situation.  Peyton thinks that small sundaes cost $2.75 and large sundaes cost $6.75.  Is Peyton correct?  Justify your answer.  Using your equations, determine algebraically the cost of one small sundae and the cost of one large sundae.

21  Zeke and six of his friends are going to a baseball game.  Their combined money totals $28.50.  At the game, hot dogs cost $1.25 each, hamburgers cost $2.50 each, and sodas cost $0.50 each.  Each person buys one soda.  They spend all $28.50 on food and soda.  Write an equation that can determine the number of hot dogs, $x$, and hamburgers, $y$, Zeke and his friends can buy.  Graph your equation on the grid below.
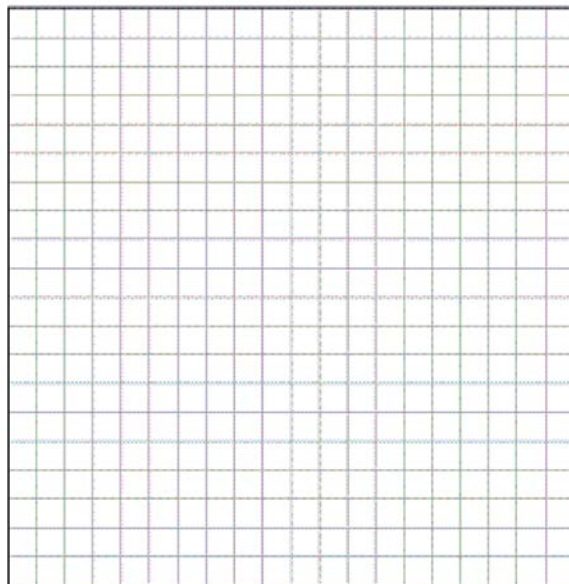
Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all $28.50.  Explain your answer.

22   When visiting friends in a state that has no sales
     tax, two families went to a fast-food restaurant for
     lunch.  The Browns bought 4 cheeseburgers and 3
     medium fries for $16.53. The Greens bought 5
     cheeseburgers and 4 medium fries for $21.11.
     Using *c* for the cost of a cheeseburger and *f* for the
     cost of medium fries, write a system of equations
     that models this situation.  The Greens said that
     since their bill was $21.11, each cheeseburger must
     cost $2.49 and each order of medium fries must
     cost $2.87 each.  Are they correct?  Justify your
     answer.  Using your equations, algebraically
     determine both the cost of one cheeseburger and
     the cost of one order of medium fries.

23   Allysa spent $35 to purchase 12 chickens.  She
     bought two different types of chickens.  Americana
     chickens cost $3.75 each and Delaware chickens
     cost $2.50 each.  Write a system of equations that
     can be used to determine the number of Americana
     chickens, *A*, and the number of Delaware chickens,
     *D*, she purchased.  Determine algebraically how
     many of each type of chicken Allysa purchased.
     Each Americana chicken lays 2 eggs per day and
     each Delaware chicken lays 1 egg per day.  Allysa
     only sells eggs by the full dozen for $2.50.
     Determine how much money she expects to take in
     at the end of the first week with her 12 chickens.

## Algebra I Multiple Choice Regents Exam Questions
## Answer Section

1  ANS:  3
   $x = 3$

   REF:  061717ai      NAT:  F.IF.C.9      TOP:  Comparing Functions
2  ANS:  1              REF:  061714ai      NAT:  S.ID.C.8      TOP:  Correlation Coefficient
3  ANS:  3              REF:  061710ai      NAT:  A.APR.B.3     TOP:  Zeros of Polynomials
4  ANS:  3              REF:  061706ai      NAT:  A.SSE.A.2
   TOP:  Factoring the Difference of Perfect Squares          KEY:  higher power
5  ANS:  4              REF:  062218ai      NAT:  A.REI.D.10    TOP:  Identifying Solutions
6  ANS:  4
   $$\frac{30}{30 + 12 + 8} = 0.6$$

   REF:  061615ai      NAT:  S.ID.B.5      TOP:  Frequency Tables
   KEY:  two-way
7  ANS:  2
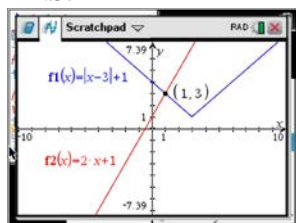


   $|x - 3| + 1 = 2x + 1$   $x - 3 = 2x$          $x - 3 = -2x$

   $|x - 3| = 2x$          $-3 = x$              $3x = 3$

                          extraneous          $x = 1$

   REF:  061622ai      NAT:  A.REI.D.11    TOP:  Other Systems
8  ANS:  1              REF:  081706ai      NAT:  F.BF.B.3      TOP:  Graphing Polynomial Functions
9  ANS:  3
   $2(x + 2)^2 = 32$

   $(x + 2)^2 = 16$

   $x + 2 = \pm 4$

   $x = -6, 2$

   REF:  061619ai      NAT:  A.REI.B.4     TOP:  Solving Quadratics
   KEY:  taking square roots
10 ANS:  3              REF:  011711ai      NAT:  F.LE.A.1      TOP:  Families of Functions

11  ANS:  1

$0 = -16t^2 + 24t$

$0 = -8t(2t - 3)$

$t = 0, \dfrac{3}{2}$

REF:  061724ai        NAT:  F.IF.B.4        TOP:  Graphing Quadratic Functions
KEY:  context

12  ANS:  4
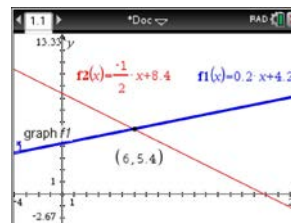


$m = \dfrac{5 - 4.6}{4 - 2} = \dfrac{.4}{2} = 0.2$   $4(0.2x + 4.2) + 2x = 33.6$   $y = 0.2(6) + 4.2 = 5.4$

$5 = .2(4) + b$         $0.8x + 16.8 + 2x = 33.6$

$4.2 = b$                $2.8x = 16.8$

$y = 0.2x + 4.2$           $x = 6$

REF:  061618ai        NAT:  A.REI.C.6        TOP:  Solving Linear Systems
KEY:  substitution

13  ANS:  1            REF:  011623ai        NAT:  F.LE.A.1        TOP:  Families of Functions

14  ANS:  3

$f(8) = \dfrac{1}{2}(8)^2 - \left(\dfrac{1}{4}(8) + 3\right) = 32 - 5 = 27$

REF:  081704ai        NAT:  F.IF.A.2        TOP:  Functional Notation

15  ANS:  3

$E(10) = 1(1.11)^{10} \approx 3$     $S(10) = 30(1.04)^{10} \approx 44$

$E(53) = 1(1.11)^{53} \approx 252$   $S(53) = 30(1.04)^{53} \approx 239$

REF:  081721ai        NAT:  A.CED.A.1        TOP:  Modeling Exponential Functions

16  ANS:  2

$7 < \dfrac{7.2 + 7.6 + p_L}{3}$  and  $\dfrac{7.2 + 7.6 + p_H}{3} < 7.8$

$6.2 < p_L$                $p_H < 8.6$

REF:  061607ai        NAT:  A.CED.A.1        TOP:  Modeling Linear Inequalities

17 ANS: 4

(1) $\dfrac{6-1}{1971-1898} = \dfrac{5}{73} \approx .07$ (2) $\dfrac{14-6}{1985-1971} = \dfrac{8}{14} \approx .57$ (3) $\dfrac{24-14}{2006-1985} = \dfrac{10}{21} \approx .48$ (4) $\dfrac{35-24}{2012-2006} = \dfrac{11}{6} \approx 1.83$

REF: 011613ai  NAT: F.IF.B.6  TOP: Rate of Change

18 ANS: 1  REF: 061603ai  NAT: F.IF.B.6  TOP: Rate of Change

19 ANS: 3  REF: 011702ai  NAT: A.REI.B.4  TOP: Solving Quadratics
KEY: factoring

20 ANS: 3

$10(x-5) = -15$ $4 + 2(x-2) = 9$ $\dfrac{1}{3}x = \dfrac{3}{2}$

$10x - 50 = -15$ $4 + 2x - 4 = 9$

$10x = 35$  $2x = 9$  $x = \dfrac{9}{2}$

$x = \dfrac{7}{2}$  $x = \dfrac{9}{2}$

REF: 082217ai  NAT: A.REI.B.3  TOP: Solving Linear Equations

21 ANS: 1  REF: 081623ai  NAT: A.APR.B.3  TOP: Graphing Polynomial Functions

22 ANS: 1
The graph is steepest between hour 0 and hour 1.

REF: 081601ai  NAT: F.IF.B.6  TOP: Rate of Change

23 ANS: 2  REF: 061702ai  NAT: A.SSE.A.1  TOP: Dependent and Independent Variables

24 ANS: 4  REF: 082204ai  NAT: F.IF.A.1  TOP: Defining Functions

25 ANS: 1  REF: 061707ai  NAT: F.LE.A.2  TOP: Families of Functions

26 ANS: 3
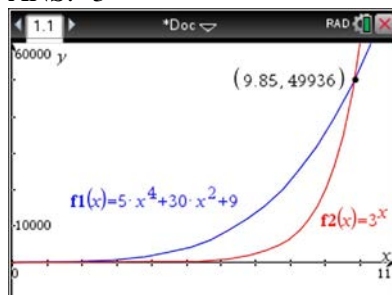


REF: 061621ai  NAT: F.LE.A.3  TOP: Families of Functions

27 ANS: 1  REF: 081618ai  NAT: F.LE.A.3  TOP: Families of Functions

28 ANS: 1  REF: 011721ai  NAT: F.IF.B.6  TOP: Rate of Change

29 ANS: 2  REF: 011619ai  NAT: F.IF.A.2  TOP: Domain and Range
KEY: real domain, exponential

30 ANS: 4  REF: 011720ai  NAT: S.ID.A.2  TOP: Central Tendency and Dispersion

31 ANS: 1

$f(x) = x^2 - 5x - 6 = (x + 1)(x - 6) = 0$

$x = -1, 6$

REF: 061612ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

32 ANS: 2

$$\frac{44 + 30}{32 + 44 + 24 + 36 + 30 + 34} = 37\%$$

REF: 082212ai     NAT: S.ID.B.5     TOP: Frequency Tables
KEY: two-way

33 ANS: 2

$f(1) = 2; \; f(2) = -5(2) + 2 = -8; \; f(3) = -5(-8) + 2 = 42; \; f(4) = -5(42) + 2 = -208$

REF: 061718ai     NAT: F.IF.A.3     TOP: Sequences     KEY: recursive

34 ANS: 3     REF: 012017ai     NAT: F.LE.A.1     TOP: Families of Functions

35 ANS: 2     REF: 011723ai     NAT: F.IF.C.9     TOP: Comparing Functions

36 ANS: 4
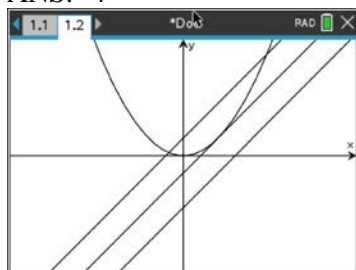


REF: 062216ai     NAT: A.REI.D.11     TOP: Quadratic-Linear Systems
KEY: AI

37 ANS: 1     REF: 011708ai     NAT: F.LE.A.2     TOP: Sequences
KEY: recursive

38 ANS: 2

$16x^2 - 36 = 4(2x + 3)(2x - 3)$

REF: 011701ai     NAT: A.SSE.A.2     TOP: Factoring the Difference of Perfect Squares
KEY: quadratic

39 ANS: 1

$2h + 8 > 3h - 6$

$14 > h$

$h < 14$

REF: 081607ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

40 ANS: 2

The *y*-intercept of both $f(x)$ and $g(x)$ is $-4$.

REF: 012013ai     NAT: F.IF.C.9     TOP: Comparing Functions

41 ANS: 3          REF: 062205ai      NAT: A.CED.A.3     TOP: Modeling Linear Inequalities

42 ANS: 2

$$x^2 - 8x = 7$$

$$x^2 - 8x + 16 = 7 + 16$$

$$(x - 4)^2 = 23$$

     REF: 011614ai      NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: completing the square

43 ANS: 3

$$j(x) = x^2 - 12x + 36 + 7 - 36$$

$$= (x - 6)^2 - 29$$

     REF: 061616ai      NAT: F.IF.C.8     TOP: Vertex Form of a Quadratic

44 ANS: 3          REF: 011618ai      NAT: F.LE.A.2     TOP: Sequences
KEY: recursive

45 ANS: 2

$$36x^2 - 100 = 4(9x^2 - 25) = 4(3x + 5)(3x - 5)$$

     REF: 081608ai      NAT: A.SSE.A.2     TOP: Factoring the Difference of Perfect Squares
KEY: quadratic

46 ANS: 2          REF: 061604ai      NAT: S.ID.C.8      TOP: Correlation Coefficient

47 ANS: 3          REF: 062209ai      NAT: A.APR.A.1     TOP: Powers of Powers

48 ANS: 3          REF: 061723ai      NAT: A.CED.A.4     TOP: Transforming Formulas

49 ANS: 2

$$6(3x - y = 7)$$

$$2(2x + 3y = 12)$$

     REF: 012020ai      NAT: A.REI.C.6     TOP: Solving Linear Systems

50 ANS: 4

$$4x^3 + x^2 + 2x$$

     REF: 012024ai      NAT: A.SSE.A.1     TOP: Modeling Expressions

51 ANS: 2          REF: 062107ai      NAT: A.CED.A.1     TOP: Modeling Linear Inequalities

52 ANS: 1          REF: 081710ai      NAT: F.IF.A.2      TOP: Domain and Range
KEY: limited domain

53 ANS: 4

$$47 - 4x < 7$$

$$-4x < -40$$

$$x > 10$$

     REF: 061713ai      NAT: A.REI.B.3     TOP: Interpreting Solutions

54  ANS: 3
$(2x + 3)(4x^2 − 5x + 6) = 8x^3 − 10x^2 + 12x + 12x^2 − 15x + 18 = 8x^3 + 2x^2 − 3x + 18$

   REF: 081612ai     NAT: A.APR.A.1     TOP: Operations with Polynomials
   KEY: multiplication

55  ANS: 4
$C(d) = 120 \bullet 2^{3d} = 120 \bullet \left(2^3\right)^d = 120 \bullet 8^d$

   REF: 082218ai     NAT: A.SSE.B.3     TOP: Modeling Exponential Functions

56  ANS: 3          REF: 062210ai     NAT: F.IF.A.1     TOP: Defining Functions
   KEY: mixed

57  ANS: 2
The slope of a line connecting $(5, 19)$ and $(10, 20)$ is lowest.

   REF: 081705ai     NAT: F.IF.B.6     TOP: Rate of Change

58  ANS: 3          REF: 062221ai     NAT: F.LE.B.5     TOP: Modeling Exponential Functions

59  ANS: 1
$Ax + By = C$

$By = C − Ax$

$y = \dfrac{C − Ax}{B}$

   REF: 062211ai     NAT: A.CED.A.4     TOP: Transforming Formulas

60  ANS: 4          REF: 011621ai     NAT: A.REI.C.6     TOP: Solving Linear Systems

61  ANS: 1
$2 + \dfrac{4}{9} x \geq 4 + x$

$−2 \geq \dfrac{5}{9} x$

$x \leq −\dfrac{18}{5}$

   REF: 081711ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

62  ANS: 3          REF: 062114ai     NAT: A.APR.A.1     TOP: Powers of Powers

63  ANS: 4          REF: 081603ai     NAT: S.ID.A.1     TOP: Box Plots
   KEY: interpret

64  ANS: 3
$3(x^2 + 4x + 4) − 12 + 11$

$3(x + 2)^2 − 1$

   REF: 081621ai     NAT: F.IF.C.8     TOP: Vertex Form of a Quadratic

65 ANS: 3
$18x^2 - 50 = 2(9x^2 - 25) = 2(3x - 5)(3x + 5)$

REF: 012006ai    NAT: A.SSE.A.2    TOP: Factoring the Difference of Perfect Squares
KEY: quadratic

66 ANS: 4
$3x + 2 \le 5x - 20$

$22 \le 2x$

$11 \le x$

REF: 061609ai    NAT: A.REI.B.3    TOP: Solving Linear Inequalities

67 ANS: 1
1) -6; 2) 1; 3) -2; 4) -2

REF: 062115ai    NAT: F.IF.C.9    TOP: Comparing Functions

68 ANS: 1
I. $-\dfrac{5}{8} + \dfrac{3}{5} = \dfrac{-1}{40}$;    III. $\left(\sqrt{5}\right) \cdot \left(\sqrt{5}\right) = \dfrac{5}{1}$;    IV. $3 \cdot \left(\sqrt{49}\right) = \dfrac{21}{1}$

REF: 011604ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

69 ANS: 3    REF: 082206ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: multiplication

70 ANS: 2    REF: 062203ai    NAT: F.BF.A.1    TOP: Modeling Linear Functions

71 ANS: 4
$2(2) < -12(-3) + 4$    $4 < -6(-3) + 4$

$4 < 40$        $4 < 22$

REF: 011716ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: solution set

72 ANS: 1
$a_2 = 2(5) - 7 = 3$    $a_3 = 2(3) - 7 = -1$    $a_4 = 2(-1) - 7 = -9$

REF: 012023ai    NAT: F.IF.A.3    TOP: Sequences    KEY: recursive

73 ANS: 4
Vertex $(15, 25)$, point $(10, 12.5)$    $12.5 = a(10 - 15)^2 + 25$

$-12.5 = 25a$

$-\dfrac{1}{2} = a$

REF: 061716ai    NAT: F.IF.C.8    TOP: Vertex Form of a Quadratic

74 ANS: 2    REF: 061712ai    NAT: F.BF.A.1    TOP: Modeling Exponential Functions

75 ANS: 2    REF: 082222ai    NAT: F.IF.A.2    TOP: Domain and Range

76 ANS: 2
(d) is the product, but not written in standard form.

REF: 062108ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: multiplication

77 ANS: 1
$2x - 4 = 0$  $3x + 4 = 0$

$x = 2$    $x = -\dfrac{4}{3}$

REF: 062212ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

78 ANS: 2
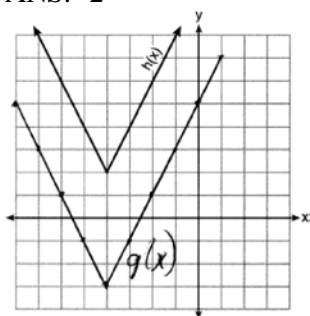


REF: 081718ai    NAT: F.IF.C.9    TOP: Comparing Functions

79 ANS: 1    REF: 081717ai    NAT: F.LE.A.1    TOP: Families of Functions

80 ANS: 1

$\dfrac{3}{2} b < 12$

$b < 12 \left( \dfrac{2}{3} \right)$

$b < 8$

REF: 062207ai    NAT: A.REI.B.3    TOP: Solving Linear Inequalities

81 ANS: 3
1, 3, 6, 10, 15, 21, 28, ...

REF: 081715ai    NAT: F.IF.A.3    TOP: Sequences    KEY: recursive

82 ANS: 3    REF: 011606ai    NAT: A.CED.A.4    TOP: Transforming Formulas

83 ANS: 2
$2x + 6y = 20$  $x + 3(6) = 10$  $-2x + 2y = 28$  $-x + 6 = 14$

$\underline{-2x - 2y = 4}$    $x = -8$    $\underline{2x + 6y = 20}$    $-x = 8$

$4y = 24$    $8y = 48$    $x = -8$

$y = 6$    $y = 6$

REF: 062120ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

84 ANS: 4    REF: 011706ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

85 ANS: 4    REF: 012022ai    NAT: S.ID.A.1    TOP: Dot Plots

86 ANS: 3    REF: 011612ai    NAT: A.SSE.A.2    TOP: Factoring Polynomials
KEY: higher power

87 ANS: 2

$$\frac{14}{16+20+14} = 28\%$$

REF: 011705ai    NAT: S.ID.B.5    TOP: Frequency Tables
KEY: two-way

88 ANS: 3

median $= 3$, IQR $= 4 - 2 = 2$, $\bar{x} = 2.75$. An outlier is outside the interval $[Q_1 - 1.5(\text{IQR}), Q_3 + 1.5(\text{IQR})]$.

$[2 - 1.5(2), 4 + 1.5(2)]$

$[-1,7]$

REF: 061620ai    NAT: S.ID.A.1    TOP: Dot Plots

89 ANS: 2    REF: 082213ai    NAT: F.LE.A.1    TOP: Families of Functions

90 ANS: 1    REF: 061711ai    NAT: A.CED.A.3    TOP: Modeling Systems of Linear Inequalities

91 ANS: 2

$$6\left(\frac{5}{6}\left(\frac{3}{8} - x\right) = 16\right)$$

$$8\left(5\left(\frac{3}{8} - x\right) = 96\right)$$

$$15 - 40x = 768$$

$$-40x = 753$$

$$x = -18.825$$

REF: 081713ai    NAT: A.REI.B.3    TOP: Solving Linear Equations
KEY: fractional expressions

92 ANS: 4    REF: 011703ai    NAT: S.ID.C.8    TOP: Correlation Coefficient

93 ANS: 4

$$36x + 30y = 96$$

REF: 081724ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

94 ANS: 3

$$\left(2\sqrt{8}\right)\left(3\sqrt{2}\right) = 6\sqrt{16} = 24$$

REF: 062109ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

95 ANS: 4    REF: 081723ai    NAT: A.CED.A.1    TOP: Modeling Quadratics

96 ANS: 4    REF: 082211ai    NAT: F.BF.B.3    TOP: Graphing Polynomial Functions

97 ANS: 2    REF: 062206ai    NAT: F.IF.B.5    TOP: Domain and Range

98  ANS: 4        REF: 081701ai      NAT: A.REI.A.1     TOP: Identifying Properties
99  ANS: 3        REF: 081614ai      NAT: A.CED.A.1     TOP: Modeling Linear Equations
100 ANS: 3

$t(m) = 2(3)^{2m+1} = 2(3)^{2m}(3)^1 = 6(3)^{2m} = 6(3^2)^m = 6(9)^m$

REF: 012019ai     NAT: A.SSE.B.3     TOP: Modeling Exponential Functions
101 ANS: 1

$\dfrac{12-10}{12-9} = \dfrac{2}{3}$  $y - 6 = \dfrac{2}{3}(x-3)$  $18 - 6 \neq \dfrac{2}{3}(16-3)$

REF: 062124ai     NAT: A.REI.D.10    TOP: Identifying Solutions
102 ANS: 3

$f(8) = \dfrac{3(8)+4}{2} = \dfrac{28}{2} = 14$

REF: 082201ai     NAT: F.IF.A.2      TOP: Functional Notation
103 ANS: 3        REF: 082203ai      NAT: A.SSE.A.2
    TOP: Factoring the Difference of Perfect Squares          KEY: quadratic
104 ANS: 4

1) $y = 3x + 2$; 2) $\dfrac{-5-2}{3-2} = -7$; 3) $y = -2x + 3$; 4) $y = -3x + 5$

REF: 081615ai     NAT: F.IF.C.9      TOP: Comparing Functions
105 ANS: 3        REF: 082207ai      NAT: A.APR.B.3     TOP: Zeros of Polynomials
106 ANS: 3        REF: 061721ai      NAT: F.LE.A.1      TOP: Families of Functions
107 ANS: 4

$3x - 24 + 4x = 8x + 4$

$7x - 24 = 8x + 4$

$-28 = x$

REF: 062106ai     NAT: A.REI.B.3     TOP: Solving Linear Equations
    KEY: integral expressions
108 ANS: 3        REF: 061601ai      NAT: A.SSE.A.2
    TOP: Factoring the Difference of Perfect Squares          KEY: higher power
109 ANS: 2        REF: 011717ai      NAT: F.BF.B.3      TOP: Graphing Polynomial Functions
110 ANS: 4        REF: 061623ai      NAT: F.IF.B.5      TOP: Domain and Range
111 ANS: 2

$r = 0.92$

REF: 081606ai     NAT: S.ID.C.8      TOP: Correlation Coefficient
112 ANS: 2        REF: 062101ai      NAT: F.BF.A.1      TOP: Modeling Linear Functions
113 ANS: 2        REF: 062220ai      NAT: A.SSE.A.1     TOP: Modeling Expressions
114 ANS: 2

$f(2) = 2(3^2) + 1 = 19$

REF: 012001ai     NAT: F.IF.A.2      TOP: Functional Notation

115  ANS:  4
(1) The box plot indicates the data is not evenly spread.  (2) The median is 62.5.  (3) The data is skewed because the mean does not equal the median.  (4) an outlier is greater than $Q3 + 1.5 \cdot IRQ = 66 + 1.5(66 - 60.5) = 74.25$.
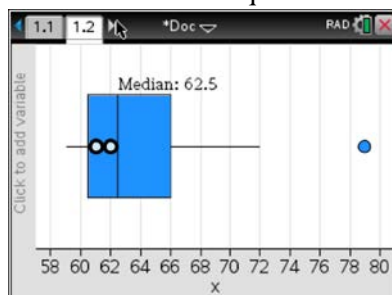


REF:  061715ai     NAT:  S.ID.A.3     TOP:  Central Tendency and Dispersion

116  ANS:  4
1) $b = 0$; 2) $b = 4$; 3) $b = -6$; 4) $b = 5$

REF:  081611ai     NAT:  F.IF.C.9     TOP:  Comparing Functions

117  ANS:  1     REF:  081617ai     NAT:  F.LE.A.2     TOP:  Modeling Exponential Functions

118  ANS:  4

$$V = \frac{1}{2} a(b + c)h$$

$$2V = a(b + c)h$$

$$\frac{2V}{ah} = b + c$$

$$\frac{2V}{ah} - c = b$$

REF:  082224ai     NAT:  A.CED.A.4     TOP:  Transforming Formulas

119  ANS:  1     REF:  012018ai     NAT:  F.IF.A.2     TOP:  Domain and Range
KEY:  real domain, absolute value

120  ANS:  1

$$C(68) = \frac{5}{9}(68 - 32) = 20$$

REF:  011710ai     NAT:  N.Q.A.1     TOP:  Conversions     KEY:  formula

121  ANS:  4     REF:  081709ai     NAT:  F.LE.B.5     TOP:  Modeling Linear Functions

122  ANS:  4
$a_2 = -3(-3) - 2 = 7$  $a_3 = -3(7) - 2 = -23$  $a_4 = -3(-23) - 2 = 67$

REF:  062224ai     NAT:  F.IF.A.3     TOP:  Sequences     KEY:  recursive

123  ANS:  2
$$f(x) = x^3 - 9x^2 = x^2(x - 9) = 0$$

$$x = 0, 9$$

REF:  012009ai     NAT:  A.APR.B.3     TOP:  Zeros of Polynomials

124 ANS: 2          REF: 061617ai          NAT: F.BF.A.1          TOP: Modeling Exponential Functions
125 ANS: 1          REF: 081707ai          NAT: A.APR.B.3          TOP: Graphing Polynomial Functions
126 ANS: 4          REF: 062204ai          NAT: A.SSE.A.2          TOP: Factoring Polynomials
     KEY: quadratic
127 ANS: 1
     The zeros of *f* are -6, -3 and 0.

     REF: 062112ai          NAT: A.APR.B.3          TOP: Graphing Polynomial Functions
     KEY: bimodalgraph
128 ANS: 4          REF: 062104ai          NAT: F.IF.A.1          TOP: Defining Functions
     KEY: ordered pairs
129 ANS: 2
     $V = 15,000(0.81)^t = 15,000((0.9)^2)^t = 15,000(0.9)^{2t}$

     REF: 081716ai          NAT: A.SSE.B.3          TOP: Modeling Exponential Functions
130 ANS: 1          REF: 081722ai          NAT: S.ID.C.8          TOP: Correlation Coefficient
131 ANS: 2
     $a_n = 4n + 8$

     $a_{35} = 4(35) + 8 = 148$

     REF: 012008ai          NAT: F.IF.A.3          TOP: Sequences          KEY: explicit
132 ANS: 3
     $(x + 4)^2 = 9$

     $x + 4 = \pm 3$

     $x = -1, -7$

     REF: 012015ai          NAT: A.REI.B.4          TOP: Solving Quadratics
     KEY: taking square roots
133 ANS: 3
     $C(t) = 10(1.029)^{24t} = 10(1.029^{24})^t \approx 10(1.986)^t$

     REF: 061614ai          NAT: A.SSE.B.3          TOP: Modeling Exponential Functions
134 ANS: 3
     $\dfrac{17 - 5}{5 - 1} = \dfrac{12}{4} = 3$

     REF: 062215ai          NAT: F.IF.A.3          TOP: Sequences          KEY: difference or ratio
135 ANS: 3          REF: 081609ai          NAT: N.Q.A.2          TOP: Using Rate
136 ANS: 3          REF: 011704ai          NAT: A.CED.A.4          TOP: Transforming Formulas

137  ANS:  1

$3x^2 + 10x - 8 = 0$

$(3x - 2)(x + 4) = 0$

$$x = \frac{2}{3}, -4$$

REF:  081619ai      NAT:  A.REI.B.4      TOP:  Solving Quadratics
KEY:  factoring

138  ANS:  4

I.  $f(4) = -\dfrac{4}{3}$ and $g(4) = 2$;  II.  $f(12) = 4$ and $g(12) = 4$

REF:  062111ai      NAT:  A.REI.D.11    TOP:  Other Systems

139  ANS:  1           REF:  011615ai     NAT:  F.IF.B.5      TOP:  Domain and Range

140  ANS:  1           REF:  061606ai     NAT:  F.LE.A.1      TOP:  Families of Functions

141  ANS:  2           REF:  012004ai     NAT:  F.IF.A.1      TOP:  Defining Functions
KEY:  ordered pairs

142  ANS:  4           REF:  062117ai     NAT:  F.LE.A.1      TOP:  Families of Functions

143  ANS:  4           REF:  061720ai     NAT:  N.Q.A.1       TOP:  Conversions
KEY:  dimensional analysis

144  ANS:  4           REF:  011718ai     NAT:  A.SSE.A.1     TOP:  Modeling Expressions

145  ANS:  2

$x(-4x^2 - x + 6) + 8 = -4x^3 - x^2 + 6x + 8$

REF:  012016ai      NAT:  A.APR.A.1    TOP:  Operations with Polynomials
KEY:  multiplication

146  ANS:  2

$3(x^2 - 1) - (x^2 - 7x + 10)$

$3x^2 - 3 - x^2 + 7x - 10$

$2x^2 + 7x - 13$

REF:  061610ai      NAT:  A.APR.A.1    TOP:  Operations with Polynomials
KEY:  subtraction

147  ANS:  3           REF:  081602ai     NAT:  A.REI.D.10   TOP:  Identifying Solutions

148  ANS:  3

$5x^2 - (4x^2 - 12x + 9) = x^2 + 12x - 9$

REF:  011610ai      NAT:  A.APR.A.1    TOP:  Operations with Polynomials
KEY:  multiplication

149  ANS:  2           REF:  061704ai     NAT:  S.ID.C.7      TOP:  Modeling Linear Functions

150  ANS:  4           REF:  061703ai     NAT:  F.IF.C.7      TOP:  Graphing Root Functions
KEY:  bimodalgraph

151  ANS:  3

$a_n = 3n + 1$

$a_5 = 3(5) + 1 = 16$

REF:  061613ai        NAT:  F.IF.A.3        TOP:  Sequences        KEY:  explicit

152  ANS:  2                REF:  012014ai        NAT:  F.LE.B.5        TOP:  Modeling Exponential Functions

153  ANS:  2

$f(-2) = (-2 - 1)^2 + 3(-2) = 9 - 6 = 3$

REF:  081605ai        NAT:  F.IF.A.2        TOP:  Functional Notation

154  ANS:  1                REF:  012002ai        NAT:  F.BF.A.1        TOP:  Modeling Exponential Functions
     KEY:  AI

155  ANS:  3                REF:  062113ai        NAT:  F.BF.B.3        TOP:  Graphing Polynomial Functions

156  ANS:  4

$31 = 4 + (10 - 1)3$

REF:  062118ai        NAT:  F.LE.A.2        TOP:  Sequences        KEY:  explicit

157  ANS:  2                REF:  061624ai        NAT:  F.LE.A.1        TOP:  Families of Functions

158  ANS:  2                REF:  081620ai        NAT:  F.IF.B.5        TOP:  Domain and Range

159  ANS:  1                REF:  062213ai        NAT:  A.CED.A.1        TOP:  Modeling Linear Equations

160  ANS:  3                REF:  011724ai        NAT:  F.LE.B.5        TOP:  Modeling Exponential Functions

161  ANS:  4                REF:  062121ai        NAT:  F.LE.A.2        TOP:  Sequences
     KEY:  recursive

162  ANS:  4

$3K - 5 = 7$

$3K = 12$

$K = 4$

REF:  082205ai        NAT:  A.REI.D.10        TOP:  Identifying Solutions

163  ANS:  3

Maximum of $f(x) = 5$  Maximum of $h(x) = 4$  Maximum of $g(x) = 5$  $j(x) = -\dfrac{1}{2}x^2 + x + 4$

$$x = \frac{-1}{2\left(-\dfrac{1}{2}\right)} = 1$$

$$j(1) = -\frac{1}{2}(1)^2 + 1 + 4 = 4\frac{1}{2}$$

REF:  062219ai        NAT:  F.IF.C.9        TOP:  Comparing Functions

164 ANS: 1

$$x^2 - 10x + 25 = 13 + 25$$

$$(x-5)^2 = 38$$

REF: 082215ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

165 ANS: 1    REF: 062222ai    NAT: N.Q.A.1    TOP: Conversions
KEY: dimensional analysis

166 ANS: 3

$$2x^3 + 12x - 10x^2 = 0$$

$$2x(x^2 - 5x + 6) = 0$$

$$2x(x-3)(x-2) = 0$$

$$x = 0, 2, 3$$

REF: 081719ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

167 ANS: 3    REF: 082209ai    NAT: F.BF.A.1    TOP: Modeling Exponential Functions

168 ANS: 1    REF: 011620ai    NAT: F.BF.B.3    TOP: Transformations with Functions
KEY: bimodalgraph

169 ANS: 4    REF: 081604ai    NAT: F.LE.A.2    TOP: Modeling Linear Functions

170 ANS: 1    REF: 081610ai    NAT: F.LE.A.2    TOP: Sequences
KEY: explicit

171 ANS: 2    REF: 011601ai    NAT: F.IF.C.8    TOP: Vertex Form of a Quadratic

172 ANS: 3

$$119.67(0.61)^5 - 119.67(0.61)^3 \approx 17.06$$

REF: 011603ai    NAT: F.IF.A.2    TOP: Evaluating Functions

173 ANS: 2    REF: 011713ai    NAT: S.ID.C.9    TOP: Analysis of Data

174 ANS: 2

$$\left( \frac{\$1824 - 1140}{3 - 0 \text{ yr}} \right) \left( \frac{1 \text{ yr}}{12 \text{ m}} \right) = \frac{\$19}{\text{m}}$$

REF: 062105ai    NAT: F.IF.B.6    TOP: Rate of Change

175 ANS: 2    REF: 011602ai    NAT: A.CED.A.2    TOP: Graphing Linear Functions

176 ANS: 2    REF: 081714ai    NAT: F.LE.A.2    TOP: Families of Functions

177 ANS: 4    REF: 082219ai    NAT: A.REI.A.1    TOP: Identifying Properties

178 ANS: 2    REF: 081624ai    NAT: F.LE.B.5    TOP: Modeling Exponential Functions

179 ANS: 2    REF: 082221ai    NAT: N.Q.A.1    TOP: Conversions

180 ANS: 1

$$3(x+4) - (2x+7) = 3x + 12 - 2x - 7 = x + 5$$

REF: 062102ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: subtraction

181 ANS: 1    REF: 061605ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

182  ANS:  3          REF:  061709ai      NAT:  F.IF.A.1          TOP:  Defining Functions
     KEY:  ordered pairs
183  ANS:  1
     $r = -0.98$

     REF:  082223ai      NAT:  S.ID.C.8      TOP:  Correlation Coefficient
184  ANS:  1
     $$2x^2 - 4x - 6 = 0$$

     $$2(x^2 - 2x - 3) = 0$$

     $$2(x - 3)(x + 1) = 0$$

     $$x = 3, -1$$

     REF:  011609ai      NAT:  A.APR.B.3      TOP:  Zeros of Polynomials
185  ANS:  4          REF:  012021ai      NAT:  F.IF.B.5          TOP:  Domain and Range
186  ANS:  2          REF:  011605ai      NAT:  A.REI.D.12      TOP:  Graphing Linear Inequalities
187  ANS:  3
     $\dfrac{138}{192} \approx 72\%$

     REF:  012010ai      NAT:  S.ID.B.5      TOP:  Frequency Tables
     KEY:  two-way
188  ANS:  4
     $$y - 34 = x^2 - 12x$$

     $$y = x^2 - 12x + 34$$

     $$y = x^2 - 12x + 36 - 2$$

     $$y = (x - 6)^2 - 2$$

     REF:  011607ai      NAT:  F.IF.C.8      TOP:  Vertex Form of a Quadratic
189  ANS:  1
     $$2(x^2 - 6x + 3) = 0$$

     $$x^2 - 6x = -3$$

     $$x^2 - 6x + 9 = -3 + 9$$

     $$(x - 3)^2 = 6$$

     REF:  011722ai      NAT:  A.REI.B.4      TOP:  Solving Quadratics
     KEY:  completing the square
190  ANS:  2          REF:  081708ai      NAT:  S.ID.C.9          TOP:  Analysis of Data
191  ANS:  2
     1) 1; 2) -3; 3) -2; 4) -1

     REF:  082214ai      NAT:  F.IF.C.9      TOP:  Comparing Functions

192  ANS: 3
For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the *x*-axis.

REF:  011624ai       NAT:  S.ID.B.6       TOP:  Residuals

193  ANS: 1

$4(x - 7) = 0.3(x + 2) + 2.11$

$4x - 28 = 0.3x + 0.6 + 2.11$

$3.7x - 28 = 2.71$

$3.7x = 30.71$

$x = 8.3$

REF:  061719ai       NAT:  A.REI.B.3       TOP:  Solving Linear Equations
KEY:  decimals

194  ANS: 2       REF:  011714ai       NAT:  A.SSE.B.3       TOP:  Modeling Exponential Functions
195  ANS: 4       REF:  012007ai       NAT:  F.BF.B.3       TOP:  Graphing Polynomial Functions
196  ANS: 3       REF:  062110ai       NAT:  A.SSE.A.2       TOP:  Factoring Polynomials
KEY:  quadratic

197  ANS: 1

$f(3) = -2(3)^2 + 32 = -18 + 32 = 14$

REF:  061705ai       NAT:  F.IF.A.2       TOP:  Functional Notation

198  ANS: 1       REF:  012011ai       NAT:  A.REI.D.10     TOP:  Identifying Solutions
199  ANS: 2       REF:  011611ai       NAT:  A.CED.A.1       TOP:  Geometric Applications of Quadratics
200  ANS: 4

$\dfrac{x - 1}{2} = a$

$x - 1 = 2a$

$x = 2a + 1$

REF:  062223ai       NAT:  A.CED.A.4       TOP:  Transforming Formulas

201  ANS: 1       REF:  082208ai       NAT:  A.SSE.A.1       TOP:  Modeling Expressions
202  ANS: 4       REF:  011608ai       NAT:  F.LE.B.5       TOP:  Modeling Exponential Functions
203  ANS: 2

$|x + 2| = 3x - 2$

$x + 2 = 3x - 2$

$4 = 2x$

$x = 2$

REF:  081702ai       NAT:  A.REI.D.11     TOP:  Other Systems

204 ANS: 1

$$12.5 \sec \times \frac{1 \text{ min}}{60 \text{ sec}} = 0.208\overline{3} \text{ min}$$

REF: 061608ai    NAT: N.Q.A.1    TOP: Conversions    KEY: dimensional analysis

205 ANS: 3    REF: 062119ai    NAT: S.ID.A.1    TOP: Box Plots

KEY: interpret

206 ANS: 1

$$\frac{1}{2}x + 3 = |x| \quad -\frac{1}{2}x - 3 = x$$

$$\frac{1}{2}x + 3 = x \qquad -x - 6 = 2x$$

$$\qquad\qquad\qquad -6 = 3x$$

$$x + 6 = 2x \qquad -2 = x$$

$$6 = x$$

REF: 011617ai    NAT: A.REI.D.11    TOP: Other Systems

207 ANS: 2    REF: 062116ai    NAT: F.IF.B.5    TOP: Domain and Range

208 ANS: 3

$$m = \frac{3 - -7}{2 - 4} = -5 \quad 3 = (-5)(2) + b \quad y = -5x + 13 \text{ represents the line passing through the points } (2,3) \text{ and } (4,-7). \text{ The}$$

$$b = 13$$

fourth equation may be rewritten as $y = 5x - 13$, so is a different line.

REF: 081720ai    NAT: A.REI.D.10    TOP: Writing Linear Equations

KEY: other forms

209 ANS: 4    REF: 061602ia    NAT: A.SSE.A.1    TOP: Modeling Expressions

210 ANS: 4    REF: 081622ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

211 ANS: 3    REF: 061701ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

212 ANS: 4    REF: 012012ai    NAT: A.SSE.A.2    TOP: Factoring Polynomials

KEY: quadratic

213 ANS: 1

$$7x + 2 \geq 58$$

$$7x \geq 56$$

$$x \geq 8$$

REF: 012003ai    NAT: A.REI.B.3    TOP: Interpreting Solutions

214 ANS: 3    REF: 011622ai    NAT: F.IF.C.9    TOP: Comparing Functions

215 ANS: 3

|        | Donna | Andrew |
|--------|-------|--------|
| mean   | 91.6  | 89.6   |
| median | 92    | 93     |
| IQR    | 6     | 12.5   |
| 3rd Q  | 94.5  | 95     |

REF: 062214ai    NAT: S.ID.A.2    TOP: Central Tendency and Dispersion

216 ANS: 4  REF: 011719ai  NAT: F.IF.B.5  TOP: Domain and Range

217 ANS: 1

$$\frac{2x^2}{x} = 2x$$

REF: 082202ai  NAT: F.IF.A.3  TOP: Sequences  KEY: difference or ratio

218 ANS: 3  REF: 062217ai  NAT: A.APR.A.1  TOP: Operations with Polynomials
KEY: multiplication

219 ANS: 3  REF: 081616ai  NAT: A.CED.A.1  TOP: Modeling Linear Equations

220 ANS: 3

$$y = 4^x$$

REF: 062208ai  NAT: F.LE.A.1  TOP: Families of Functions

221 ANS: 2

$$2x^3 + 3x^2 + 7x - 6$$

REF: 082216ai  NAT: A.SSE.A.1  TOP: Modeling Expressions

222 ANS: 1

$$a_2 = 3(-2) + 1 = -5 \quad a_3 = 3(-5) + 1 = -14 \quad a_3 = 3(-14) + 1 = -41$$

REF: 082220ai  NAT: F.IF.A.3  TOP: Sequences  KEY: recursive

223 ANS: 2

$$x^2 - 8x + 16 = 10 + 16$$

$$(x - 4)^2 = 26$$

$$x - 4 = \pm\sqrt{26}$$

$$x = 4 \pm \sqrt{26}$$

REF: 061722ai  NAT: A.REI.B.4  TOP: Solving Quadratics
KEY: completing the square

224 ANS: 2  REF: 062201ai  NAT: S.ID.C.9  TOP: Analysis of Data

225 ANS: 4  REF: 011616ai  NAT: F.LE.A.2  TOP: Families of Functions

226 ANS: 2

$$f(3) = 3(3) - 5 = 4$$

REF: 062202ai  NAT: F.IF.A.2  TOP: Functional Notation

227 ANS: 3  REF: 081703ai  NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares  KEY: quadratic

228 ANS: 1  REF: 011712ai  NAT: F.IF.C.7  TOP: Graphing Absolute Value Functions

229 ANS: 4

$$3x^4 - 4x^2 - 4$$

REF: 062122ai  NAT: A.SSE.A.1  TOP: Modeling Expressions

230 ANS: 1

$3(-2x + 2x + 8) = 12$

$\quad\quad 24 \neq 12$

REF: 061708ai     NAT: A.REI.C.6     TOP: Solving Linear Systems
KEY: substitution

231 ANS: 2

$\dfrac{x-3}{4} + \dfrac{8}{12} = \dfrac{17}{12}$

$\quad\quad \dfrac{x-3}{4} = \dfrac{9}{12}$

$\quad\quad \dfrac{x-3}{4} = \dfrac{3}{4}$

$\quad\quad x - 3 = 3$

$\quad\quad\quad x = 6$

REF: 012005ai     NAT: A.REI.B.3     TOP: Solving Linear Equations
KEY: fractional expressions

232 ANS: 2

$f(x) = x^2 + 2x - 8 = x^2 + 2x + 1 - 9 = (x+1)^2 - 9$

REF: 061611ai     NAT: F.IF.A.2     TOP: Domain and Range
KEY: real domain, quadratic

233 ANS: 2     REF: 081712ai     NAT: A.SSE.A.1     TOP: Modeling Expressions

234 ANS: 2

$\dfrac{22.7 \text{ m}}{\text{hr}} \times \dfrac{1 \text{ hr}}{60 \text{ min}} \times \dfrac{1.609 \text{ km}}{1 \text{ m}} = \dfrac{0.6 \text{ km}}{\text{min}}$

REF: 062123ai     NAT: N.Q.A.1     TOP: Conversions     KEY: dimensional analysis

235 ANS: 2

$K(-3) = 2(-3)^2 - 5(-3) + 3 = 18 + 15 + 3 = 36$

REF: 062103ai     NAT: F.IF.A.2     TOP: Functional Notation

236 ANS: 2     REF: 011709ai     NAT: F.LE.B.5     TOP: Modeling Linear Functions

237 ANS: 1     REF: 082210ai     NAT: S.ID.A.1     TOP: Dot Plots

238 ANS: 3

$\dfrac{5.4 - 4}{4} = 0.35$

REF: 011802ai     NAT: F.LE.A.2     TOP: Modeling Exponential Functions

239 ANS: 3

The rocket was in the air more than 7 seconds before hitting the ground.

REF: 081613ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
KEY: context

240 ANS: 4

$2(3g - 4) - (8g + 3) = 6g - 8 - 8g - 3 = -2g - 11$

    REF: 011707ai     NAT: A.APR.A.1    TOP: Operations with Polynomials
    KEY: subtraction

241 ANS: 4

$36x^2 = 25$

$$x^2 = \frac{25}{36}$$

$$x = \pm\frac{5}{6}$$

    REF: 011715ai     NAT: A.REI.B.4    TOP: Solving Quadratics
    KEY: taking square roots

**Algebra I Multiple Choice Regents Exam Questions**
**Answer Section**

242 ANS: 4            REF: 011912ai     NAT: F.LE.A.2       TOP: Modeling Exponential Functions
243 ANS: 3            REF: 011809ai     NAT: A.SSE.A.2
   TOP: Factoring the Difference of Perfect Squares          KEY: higher power
244 ANS: 3
   $(2x + 3)(x + 4) = 2x^2 + 11x + 12$

   REF: 081916ai     NAT: A.SSE.A.2     TOP: Factoring Polynomials
   KEY: quadratic
245 ANS: 4
   $f(-1) = (-1)^2 - 3(-1) + 4 = 8$

   REF: 061808ai     NAT: A.REI.D.10    TOP: Identifying Solutions
246 ANS: 3            REF: 081908ai     NAT: A.SSE.A.2
   TOP: Factoring the Difference of Perfect Squares          KEY: quadratic
247 ANS: 2
   $f(-3) = -12 + 5 = -7$

   REF: 061902ai     NAT: F.IF.A.2      TOP: Functional Notation
248 ANS: 1
   $5r = a_2 \quad a_2 r = 245 \quad 5r = \dfrac{245}{r}$

   $\qquad\quad a_2 = \dfrac{245}{r} \quad 5r^2 = 245$

   $\qquad\qquad\qquad\qquad r^2 = 49$

   $\qquad\qquad\qquad\qquad r = \pm 7$

   REF: 081924ai     NAT: F.IF.A.3      TOP: Sequences     KEY: difference or ratio
249 ANS: 2            REF: 061916ai     NAT: S.ID.B.6      TOP: Regression
   KEY: exponential
250 ANS: 4
   $-2 \neq (-1)^3 - (-1)$

   $-2 \neq 0$

   REF: 011806ai     NAT: A.REI.D.10    TOP: Identifying Solutions
251 ANS: 3
   $10.25 \neq 3(1.25)^2 - 1.25 + 7$

   REF: 061918ai     NAT: A.REI.D.10    TOP: Identifying Solutions
252 ANS: 3            REF: 061816ai     NAT: F.IF.A.2      TOP: Domain and Range
   KEY: real domain, quadratic
253 ANS: 2            REF: 061805ai     NAT: S.ID.A.1      TOP: Box Plots
   KEY: interpret

254 ANS: 1

I. $10 \, \text{mi} \left( \dfrac{1.609 \, \text{km}}{1 \, \text{mi}} \right) = 16.09 \, \text{km}$; II. $44880 \, \text{ft} \left( \dfrac{1 \, \text{mi}}{5280 \, \text{ft}} \right) \left( \dfrac{1.609 \, \text{km}}{1 \, \text{mi}} \right) \approx 13.6765 \, \text{km}$; III.

$15560 \, \text{yd} \left( \dfrac{3 \, \text{ft}}{1 \, \text{yd}} \right) \left( \dfrac{1 \, \text{mi}}{5280 \, \text{ft}} \right) \left( \dfrac{1.609 \, \text{km}}{1 \, \text{mi}} \right) \approx 14.225 \, \text{km}$

REF: 061815ai    NAT: N.Q.A.1    TOP: Conversions   KEY: dimensional analysis

255 ANS: 2

1) $x = \dfrac{-2}{2(1)} = -1$, $h(-1) = (-1)^2 + 2(-1) - 6 = -7$; 2) $y = -10$; 3) $k \left( \dfrac{-5 + -2}{2} \right) = (-3.5 + 5)(-3.5 + 2) = -2.25$; 4)

$y = -6$

REF: 061813ai    NAT: F.IF.C.9    TOP: Comparing Functions

256 ANS: 2         REF: 011815ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

257 ANS: 1         REF: 081805ai    NAT: F.IF.A.2    TOP: Functional Notation

258 ANS: 2         REF: 081907ai    NAT: F.LE.A.1    TOP: Families of Functions

259 ANS: 4         REF: 081902ai    NAT: F.IF.A.1    TOP: Defining Functions
    KEY: ordered pairs

260 ANS: 1         REF: 061905ai    NAT: A.SSE.A.1    TOP: Modeling Expressions

261 ANS: 1         REF: 081918ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

262 ANS: 3
    $2(x - y = 3)$

    $2x - 2y = 6$

REF: 081822ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

263 ANS: 3

1) $B$'s zeros are $-2$ and $-6$ and $C$'s zeros are $-4$ and $-2$; 2) $A$'s $y$-intercept is 4 and $B$'s $y$-intercept is 12; 3) $B$ in standard form, $a > 0$ and $C$ in standard form, $a < 0$; d) $A$ has no minimum

REF: 061914ai    NAT: F.IF.C.9    TOP: Comparing Functions

264 ANS: 1

$\dfrac{91 \, \text{cm}}{\text{day}} \times \dfrac{1 \, \text{day}}{24 \, \text{hrs}} \times \dfrac{1 \, \text{inch}}{2.54 \, \text{cm}} \approx \dfrac{1.49 \, \text{in}}{\text{hr}}$

REF: 061924ai    NAT: N.Q.A.1    TOP: Conversions   KEY: dimensional analysis

265 ANS: 2

$P = I^2 R$

$I^2 = \dfrac{P}{R}$

$I = \sqrt{\dfrac{P}{R}}$

REF: 011920ai    NAT: A.CED.A.4    TOP: Transforming Formulas

266  ANS:  2
From 1996-2012, the average rate of change was positive for three age groups.

REF:  011824ai        NAT:  F.IF.B.6        TOP:  Rate of Change

267  ANS:  3
$$\left(6x^2 + 2x\right)(5x - 6) = 30x^3 - 36x^2 + 10x^2 - 12x = 30x^3 - 26x^2 - 12x$$

REF:  081824ai        NAT:  A.APR.A.1    TOP:  Operations with Polynomials
KEY:  multiplication

268  ANS:  3

The minimum of $r(x)$ is $-16$.  The minimum of $q(x)$ is $-9$ $\left(x = \dfrac{-2}{2(1)} = -1, q(-1) = -9\right)$.

REF:  081917ai        NAT:  F.IF.C.9        TOP:  Comparing Functions

269  ANS:  2            REF:  061904ai        NAT:  F.BF.B.3        TOP:  Graphing Polynomial Functions

270  ANS:  1
$$g(-3) = -2(-3)^2 + 3(-3) = -18 - 9 = -27$$

REF:  011902ai        NAT:  F.IF.A.2        TOP:  Functional Notation

271  ANS:  3
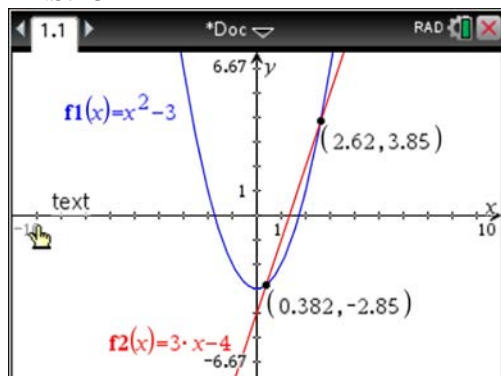


REF:  011810ai        NAT:  A.REI.C.7        TOP:  Quadratic-Linear Systems
KEY:  algebraically

272  ANS:  3            REF:  061911ai        NAT:  F.LE.A.1        TOP:  Families of Functions
273  ANS:  3            REF:  081914ai        NAT:  A.REI.D.11        TOP:  Other Systems
274  ANS:  1            REF:  011803ai        NAT:  A.CED.A.3        TOP:  Modeling Linear Systems
275  ANS:  1            REF:  081802ai        NAT:  F.LE.A.1        TOP:  Families of Functions
276  ANS:  2            REF:  081810ai        NAT:  A.CED.A.3        TOP:  Modeling Systems of Linear Inequalities
277  ANS:  1
$$8 - 1 = 7$$

REF:  081915ai        NAT:  S.ID.A.1        TOP:  Box Plots        KEY:  interpret

278  ANS:  4
$$k(9) = 2(9)^2 - 3\sqrt{9} = 162 - 9 = 153$$

REF:  061802ai     NAT:  F.IF.A.2     TOP:  Functional Notation
279  ANS:  2
$$\frac{60 - 45}{60} = \frac{15}{60} = \frac{1}{4}$$

REF:  081814ai     NAT:  S.ID.B.5     TOP:  Frequency Tables
KEY:  two-way
280  ANS:  2
$$-4.9(0)^2 + 50(0) + 2$$

REF:  011811ai     NAT:  F.IF.B.4     TOP:  Graphing Quadratic Functions
KEY:  context
281  ANS:  2
$$(x^2 - 5x)(2x + 3) = 2x^3 + 3x^2 - 10x^2 - 15x = 2x^3 - 7x^2 - 15x$$

REF:  081912ai     NAT:  A.SSE.A.1     TOP:  Modeling Expressions
282  ANS:  4
II is linear.

REF:  081823ai     NAT:  F.LE.A.1     TOP:  Families of Functions
283  ANS:  1          REF:  061922ai     NAT:  S.ID.A.2     TOP:  Dispersion
KEY:  basic
284  ANS:  2          REF:  011901ai     NAT:  S.ID.B.6     TOP:  Scatter Plots
KEY:  line of best fit
285  ANS:  4
$$x = \frac{-(-2)}{2(2)} = \frac{1}{2} \quad h\left(\frac{1}{2}\right) = -\frac{9}{2}$$

REF:  081923ai     NAT:  F.IF.A.2     TOP:  Domain and Range
KEY:  real domain, quadratic
286  ANS:  1          REF:  011906ai     NAT:  A.SSE.A.2     TOP:  Factoring Polynomials
KEY:  quadratic
287  ANS:  4          REF:  011908ai     NAT:  A.REI.A.1     TOP:  Identifying Properties
288  ANS:  1
$$a_2 = 3 + 2(6)^2 = 75$$

REF:  081919ai     NAT:  F.IF.A.3     TOP:  Sequences     KEY:  recursive
289  ANS:  1
$$d = \frac{37 - 31}{6 - 3} = 2 \quad a_n = 2n + 25$$
$$a_{20} = 2(20) + 25 = 65$$

REF:  061807ai     NAT:  F.IF.A.3     TOP:  Sequences     KEY:  explicit

290 ANS: 4           REF: 061823ai     NAT: A.CED.A.4     TOP: Transforming Formulas

291 ANS: 3           REF: 081901ai     NAT: A.SSE.A.1     TOP: Modeling Expressions

292 ANS: 3           REF: 081807ai     NAT: A.SSE.A.2

     TOP: Factoring the Difference of Perfect Squares           KEY: quadratic

293 ANS: 4           REF: 081815ai     NAT: F.IF.C.7     TOP: Graphing Piecewise-Defined Functions

294 ANS: 3           REF: 011820ai     NAT: A.REI.D.12     TOP: Graphing Systems of Linear Inequalities

     KEY: solution set

295 ANS: 3           REF: 061917ai     NAT: A.SSE.A.2     TOP: Factoring Polynomials

     KEY: quadratic

296 ANS: 3

$$f(x) = (x - 1)(x^2 - 4) = (x - 1)(x - 2)(x + 2)$$

     REF: 061908ai     NAT: A.APR.B.3     TOP: Graphing Polynomial Functions

297 ANS: 3           REF: 011910ai     NAT: F.BF.B.3     TOP: Graphing Polynomial Functions

298 ANS: 3

$$f(-2) = 0, f(3) = 10, f(5) = 42$$

     REF: 011812ai     NAT: F.IF.A.2     TOP: Domain and Range

     KEY: limited domain

299 ANS: 4

$$a + 7b > -8b$$

$$a > -15b$$

     REF: 061913ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

300 ANS: 1           REF: 011805ai     NAT: F.LE.A.1     TOP: Families of Functions

301 ANS: 3           REF: 081819ai     NAT: A.REI.D.11     TOP: Other Systems

302 ANS: 3           REF: 081812ai     NAT: N.Q.A.1     TOP: Conversions

     KEY: dimensional analysis

303 ANS: 3           REF: 011818ai     NAT: F.LE.A.2     TOP: Sequences

     KEY: recursive

304 ANS: 3           REF: 011813ai     NAT: A.APR.A.1     TOP: Operations with Polynomials

     KEY: addition

305 ANS: 2           REF: 081806ai     NAT: F.IF.A.2     TOP: Domain and Range

     KEY: limited domain

306 ANS: 2

$$3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5) = 3x^2 + 6x - 9 - 16x^2 + 28x - 20 = -13x^2 + 34x - 29$$

     REF: 061803ai     NAT: A.APR.A.1     TOP: Operations with Polynomials

     KEY: subtraction

307  ANS:  2

$$\frac{3}{5}\left(x+\frac{4}{3}\right)=1.04$$

$$3\left(x+\frac{4}{3}\right)=5.2$$

$$3x+4=5.2$$

$$3x=1.2$$

$$x=0.4$$

REF:  011905ai    NAT:  A.REI.B.3    TOP:  Solving Linear Equations
KEY:  decimals

308  ANS:  2

$$\frac{26}{42+26}=0.382$$

REF:  061912ai    NAT:  S.ID.B.5    TOP:  Frequency Tables
KEY:  two-way

309  ANS:  2

$$w(w+7)=w^2+7w$$

REF:  081920ai    NAT:  A.CED.A.1    TOP:  Geometric Applications of Quadratics

310  ANS:  2    REF:  081809ai    NAT:  A.CED.A.3    TOP:  Modeling Linear Systems

311  ANS:  1

$$h(t)=0$$

$$-16t^2+64t+80=0$$

$$t^2-4t-5=0$$

$$(t-5)(t+1)=0$$

$$t=5,-1$$

REF:  081910ai    NAT:  F.IF.B.4    TOP:  Graphing Quadratic Functions
KEY:  context

312  ANS:  3    REF:  081803ai    NAT:  A.SSE.A.2    TOP:  Factoring Polynomials
KEY:  quadratic

313  ANS:  2

$f(-2)=f(-1)=-16,\ f(0)=-12,\ f(1)=-4$

REF:  011914ai    NAT:  F.IF.A.2    TOP:  Domain and Range
KEY:  limited domain

314  ANS:  4

The $y$-intercept for $f(x)$ is $(0,1)$.  The $y$-intercept for $g(x)$ is $(0,3)$.  The $y$-intercept for $h(x)$ is $(0,-1)$.

REF:  081811ai    NAT:  F.IF.C.9    TOP:  Comparing Functions

315 ANS: 3

$\sqrt{576} = 24 \quad \sqrt{684} = 6\sqrt{19}$

REF: 011808ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

316 ANS: 3

$a_2 = n\left(a_{2-1}\right) = 2 \cdot 1 = 2, \, a_3 = n\left(a_{3-1}\right) = 3 \cdot 2 = 6, \, a_4 = n\left(a_{4-1}\right) = 4 \cdot 6 = 24, \, a_5 = n\left(a_{2-1}\right) = 5 \cdot 24 = 120$

REF: 061824ai     NAT: F.IF.A.3     TOP: Sequences     KEY: recursive

317 ANS: 4

$f(4) = q(4) = p(4) = 3$

REF: 011921ai     NAT: F.IF.C.9     TOP: Comparing Functions

318 ANS: 2

$(1.0005)^7 \approx 1.0035$

REF: 081913ai     NAT: A.SSE.B.3     TOP: Modeling Exponential Functions

319 ANS: 1

$\sqrt{2} \cdot \sqrt{18} = \sqrt{36} = \dfrac{6}{1}$ may be expressed as the ratio of two integers.

REF: 061907ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

320 ANS: 1

$3(x-4)^2 = 27$

$(x-4)^2 = 9$

$x - 4 = \pm 3$

$x = 1, 7$

REF: 011814ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: taking square roots

321 ANS: 2

$\dfrac{5 \pm \sqrt{(-5)^2 - 4(1)(-4)}}{2(1)} = \dfrac{5 \pm \sqrt{41}}{2}$

REF: 061921ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: quadratic formula

322 ANS: 3     REF: 081808ai     NAT: F.BF.B.3     TOP: Graphing Polynomial Functions
323 ANS: 2     REF: 081816ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials
324 ANS: 2     REF: 011919ai     NAT: F.LE.A.2     TOP: Sequences
KEY: recursive

325 ANS: 4

$4p + 2 < 2p + 10$

$2p < 8$

$p < 4$

REF: 061801ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

326 ANS: 2     REF: 061923ai     NAT: F.LE.B.5     TOP: Modeling Exponential Functions

327 ANS: 4     REF: 061901ai     NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares     KEY: higher power AI

328 ANS: 2     REF: 081817ai     NAT: F.LE.B.5     TOP: Modeling Linear Functions

329 ANS: 4     REF: 011917ai     NAT: F.IF.A.2     TOP: Domain and Range

KEY: graph

330 ANS: 3

$b^2 - 4ac = 2^2 - 4(4)(5) = -76$

REF: 061822ai     NAT: A.REI.B.4     TOP: Using the Discriminant

331 ANS: 2     REF: 011804ai     NAT: F.IF.A.1     TOP: Defining Functions

KEY: graphs

332 ANS: 1

1) The mode is a bit high.

2) $Q_1 = 41, Q_3 = 68,$ 1.5 times the IQR of 27 is 40.5, $Q_1 - 1.5IQR = 41 - 40.5 = 0.5,$

$Q_3 + 1.5IQR = 68 + 40.5 = 108.5,$ so the data have two outliers.

REF: 011816ai     NAT: S.ID.A.3     TOP: Central Tendency and Dispersion

333 ANS: 1

$y = x^2 + 24x + 144 - 18 - 144$

$y = (x + 12)^2 - 162$

REF: 081911ai     NAT: F.IF.C.8     TOP: Vertex Form of a Quadratic

334 ANS: 4     REF: 011821ai     NAT: A.SSE.B.3     TOP: Modeling Exponential Functions

335 ANS: 3     REF: 011909ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

336 ANS: 4     REF: 061814ai     NAT: F.LE.A.1     TOP: Families of Functions

337 ANS: 3

$\dfrac{4}{3} = \dfrac{x + 10}{15}$

$3x + 30 = 60$

$x = 10$

REF: 081904ai     NAT: A.REI.B.3     TOP: Solving Linear Equations

KEY: fractional expressions

338 ANS: 2     REF: 061818ai     NAT: A.APR.B.3     TOP: Graphing Polynomial Functions

339 ANS: 1

$$2\left(3x^3 + 2x^2 - 17\right)$$

REF: 081813ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: addition

340 ANS: 1

$$116(30) + 439L \le 6500$$

$$439L \le 3020$$

$$L \le 6.879$$

REF: 011904ai    NAT: A.CED.A.1    TOP: Modeling Linear Inequalities

341 ANS: 1          REF: 061810ai    NAT: A.SSE.A.2    TOP: Factoring Polynomials
KEY: quadratic

342 ANS: 4          REF: 061811ai    NAT: F.IF.A.1    TOP: Defining Functions
KEY: ordered pairs

343 ANS: 3

$$l(w) = 3.1w - 16.2, \ l(10) = 3.1(10) - 16.2 = 14.8, \ l(13) = 3.1(13) - 16.2 = 24.1; \ p(w) = 2.5(1.52)^{w-6},$$

$$p(10) = 2.5(1.52)^{10-6} \approx 13.3, \ p(13) = 2.5(1.52)^{13-6} \approx 46.9$$

REF: 011916ai    NAT: F.LE.A.3    TOP: Families of Functions

344 ANS: 2

$$\frac{56}{56 + 74 + 103} \approx 0.24$$

REF: 081906ai    NAT: S.ID.B.5    TOP: Frequency Tables
KEY: two-way

345 ANS: 1          REF: 061806ai    NAT: A.CED.A.3    TOP: Modeling Linear Inequalities

346 ANS: 4          REF: 061920ai    NAT: F.IF.B.5    TOP: Domain and Range

347 ANS: 2

$$-2 + 8x = 3x + 8$$

$$5x = 10$$

$$x = 2$$

REF: 081804ai    NAT: A.REI.B.3    TOP: Solving Linear Equations
KEY: integral expressions

348 ANS: 1

$$h(0) = -4.9(0)^2 + 6(0) + 5 = 5$$

REF: 011913ai    NAT: F.IF.B.4    TOP: Graphing Quadratic Functions
KEY: context

349  ANS:  3

$\sqrt{36} \div \sqrt{225} = \dfrac{6}{15}$ may be expressed as the ratio of two integers.

REF:  011903ai     NAT:  N.RN.B.3     TOP:  Operations with Radicals
KEY:  classify

350  ANS:  3
$y = -3x - 4$
$2x - 3(-3x - 4) = -21$

REF:  011922ai     NAT:  A.REI.C.6     TOP:  Solving Linear Systems
KEY:  substitution

351  ANS:  4          REF:  011801ai     NAT:  A.REI.A.1     TOP:  Identifying Properties
352  ANS:  2          REF:  081801ai     NAT:  A.SSE.B.3     TOP:  Modeling Exponential Functions
353  ANS:  3          REF:  061819ai     NAT:  A.SSE.A.1     TOP:  Modeling Expressions
354  ANS:  3          REF:  061820ai     NAT:  F.IF.C.9      TOP:  Comparing Functions
355  ANS:  3

$2a^2 - 5 - 2(3 - a) = 2a^2 - 5 - 6 + 2a = 2a^2 + 2a - 11$

REF:  011911ai     NAT:  A.APR.A.1     TOP:  Operations with Polynomials
KEY:  subtraction

356  ANS:  4          REF:  011924ai     NAT:  N.Q.A.1      TOP:  Conversions
KEY:  dimensional analysis

357  ANS:  2          REF:  011819ai     NAT:  F.BF.B.3     TOP:  Graphing Polynomial Functions
358  ANS:  3

$x^2 - 6x = 12$

$x^2 - 6x + 9 = 12 + 9$

$(x - 3)^2 = 21$

REF:  061812ai     NAT:  A.REI.B.4     TOP:  Solving Quadratics
KEY:  completing the square

359  ANS:  2          REF:  061919ai     NAT:  F.IF.A.3     TOP:  Sequences
KEY:  difference or ratio

360  ANS:  4
Time is continuous and positive.

REF:  081921ai     NAT:  F.IF.B.5     TOP:  Domain and Range

361  ANS:  3
$p(x) = x^2 - 2x - 24 = (x - 6)(x + 4) = 0$

$x = 6, -4$

REF:  061804ai     NAT:  A.APR.B.3     TOP:  Zeros of Polynomials

362  ANS:  2          REF:  061821ai     NAT:  F.IF.B.5     TOP:  Domain and Range

363 ANS: 4

$$\frac{2}{3}\left(\frac{1}{4}x-2\right)=\frac{1}{5}\left(\frac{4}{3}x-1\right)$$

$$10(3x-24)=3(16x-12)$$

$$30x-240=48x-36$$

$$-204=18x$$

$$x=-11.\overline{3}$$

REF: 011822ai    NAT: A.REI.B.3    TOP: Solving Linear Equations
KEY: fractional expressions

364 ANS: 4    REF: 061909ai    NAT: A.REI.A.1    TOP: Identifying Properties

365 ANS: 2

1) $x=\dfrac{-2}{2(-1)}=1$    ; 2) $h=\dfrac{3}{2}$ Using (0,3), $3=a\left(0-\dfrac{3}{2}\right)^2+k$; Using (1,5), $5=a\left(1-\dfrac{3}{2}\right)^2+k$

$y=-1^2+2(1)+4=5$    $3=\dfrac{9}{4}a+k$    $5=\dfrac{1}{4}a+k$

vertex (1,5)    $k=3-\dfrac{9}{4}a$    $k=5-\dfrac{1}{4}a$

$5-\dfrac{1}{4}a=3-\dfrac{9}{4}a$ $k=5-\dfrac{1}{4}(-1)=\dfrac{21}{4}$; 3) vertex (5,5); 4) Using $c=1$  $-9=(-2)^2a+(-2)b+1$

$20-a=12-9a$    vertex $\left(\dfrac{3}{2},\dfrac{21}{4}\right)$    $-10=4a-2b$

$8a=-8$    $b=2a+5$

$a=-1$

$-3=(-1)^2a+(-1)b+1$ $2a+5=a+4$ $x=\dfrac{-3}{2(-1)}=\dfrac{3}{2}$    vertex $\left(\dfrac{3}{2},\dfrac{13}{4}\right)$

$-3=a-b+1$    $a=-1$

$b=a+4$    $b=-1+4=3$ $y=-\left(\dfrac{3}{2}\right)^2+3\left(\dfrac{3}{2}\right)+1=-\dfrac{9}{4}+\dfrac{18}{4}+\dfrac{4}{4}=\dfrac{13}{4}$

REF: 011823ai    NAT: F.IF.C.9    TOP: Comparing Functions

366 ANS: 1

$$\frac{58+41}{42+58+20+84+41+5}=\frac{99}{250}=0.396$$

REF: 061809ai    NAT: S.ID.B.5    TOP: Frequency Tables
KEY: two-way

11

367 ANS: 1

$x - 4y = -10$   $x + 3 = 5$   $5x = 10$   $2 + y = 5$

$\underline{x + y = 5}$        $x = 2$    $x = 2$    $y = 3$

$-5y = -15$

$y = 3$

REF: 081922ai    NAT: A.REI.C.6    TOP: Solving Linear Systems

368 ANS: 4

$2(x^2 - 1) + 3x(x - 4) = 2x^2 - 2 + 3x^2 - 12x = 5x^2 - 12x - 2$

REF: 081903ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: addition

369 ANS: 4       REF: 081909ai    NAT: N.Q.A.2    TOP: Using Rate
370 ANS: 3       REF: 061817ai    NAT: F.LE.B.5    TOP: Modeling Linear Functions
371 ANS: 1       REF: 061906ai    NAT: F.LE.A.1    TOP: Families of Functions
372 ANS: 4       REF: 061903ai    NAT: F.IF.A.1    TOP: Defining Functions
KEY: mixed

373 ANS: 4

$P(c) = (.50 + .25)c - 9.96 = .75c - 9.96$

REF: 011807ai    NAT: F.BF.A.1    TOP: Modeling Linear Functions

374 ANS: 1

$3(10) + 2 \neq (-2)^2 - 5(-2) + 17$

$32 \neq 31$

REF: 081818ai    NAT: A.REI.D.10    TOP: Identifying Solutions

375 ANS: 4       REF: 081820ai    NAT: F.LE.A.2    TOP: Sequences
KEY: explicit

376 ANS: 3       REF: 081821ai    NAT: S.ID.C.9    TOP: Analysis of Data

377 ANS: 2

$-2(x - 5) < 10$

$x - 5 > -5$

$x > 0$

REF: 011817ai    NAT: A.REI.B.3    TOP: Interpreting Solutions

378 ANS: 1

$-5 - 2 = -7$

REF: 081905ai    NAT: F.BF.B.3    TOP: Graphing Polynomial Functions

379 ANS: 3

$y = (-1)^2 - 3(-1) - 2 = 2, \; y = 4(-1) + 6 = 2$

REF: 011918ai    NAT: A.REI.D.11    TOP: Other Systems

380 ANS: 4          REF: 011907ai          NAT: F.IF.A.1          TOP: Defining Functions
KEY: mixed

381 ANS: 4

$1000(0.5)^{2t} = 1000(0.5^2)^t = 1000(0.25)^t$

REF: 011923ai          NAT: A.SSE.B.3          TOP: Modeling Exponential Functions

382 ANS: 4

Over the interval $0 \le x \le 3$, the average rate of change for $h(x) = \dfrac{9-2}{3-0} = \dfrac{7}{3}$, $f(x) = \dfrac{7-1}{3-0} = \dfrac{6}{3} = 2$, and

$g(x) = \dfrac{3-0}{3-0} = \dfrac{3}{3} = 1$.

REF: spr1301ai          NAT: F.IF.C.9          TOP: Comparing Functions

383 ANS: 1

$x^2 + 8x = 33$

$x^2 + 8x + 16 = 33 + 16$

$(x+4)^2 = 49$

REF: 011915ai          NAT: A.REI.B.4          TOP: Solving Quadratics
KEY: completing the square

384 ANS: 2          REF: 061915ai          NAT: A.CED.A.1          TOP: Modeling Linear Equations

# Algebra I Multiple Choice Regents Exam Questions
# Answer Section

385  ANS: 2          REF: 061516ai          NAT: S.ID.C.9          TOP: Analysis of Data
386  ANS: 3          REF: 061501ai          NAT: F.LE.B.5          TOP: Modeling Linear Functions
387  ANS: 3          REF: 081509ai          NAT: A.SSE.A.2          TOP: Factoring Polynomials
     KEY: quadratic
388  ANS: 2          REF: 011501ai          NAT: F.LE.B.5          TOP: Modeling Linear Functions
389  ANS: 1          REF: 061401ai          NAT: A.REI.A.1          TOP: Identifying Properties
390  ANS: 3          REF: 081523ai          NAT: A.REI.B.4          TOP: Solving Quadratics
     KEY: taking square roots
391  ANS: 4          REF: 081419ai          NAT: A.CED.A.3          TOP: Modeling Linear Systems
392  ANS: 1          REF: 061505ai          NAT: A.REI.D.12          TOP: Graphing Linear Inequalities
393  ANS: 4

$$\frac{750+2.25p}{p} > 2.75 \qquad \frac{750+2.25p}{p} < 3.25$$

$$750+2.25p > 2.75p \qquad 750+2.25p < 3.25p$$

$$750 > .50p \qquad\qquad 750 < p$$

$$1500 > p$$

     REF: 061524ai          NAT: A.CED.A.1          TOP: Modeling Linear Inequalities
394  ANS: 2          REF: 061513ai          NAT: F.LE.A.2          TOP: Families of Functions
395  ANS: 2          REF: 081511ai          NAT: F.IF.A.1          TOP: Defining Functions
     KEY: mixed
396  ANS: 2          REF: 061503ai          NAT: A.SSE.A.2
     TOP: Factoring the Difference of Perfect Squares          KEY: multivariable
397  ANS: 2

$$x^2 + 4x = 16$$

$$x^2 + 4x + 4 = 16 + 4$$

$$(x+2)^2 = 20$$

$$x + 2 = \pm\sqrt{4 \cdot 5}$$

$$= -2 \pm 2\sqrt{5}$$

     REF: 061410ai          NAT: A.REI.B.4          TOP: Solving Quadratics
     KEY: completing the square
398  ANS: 1          REF: 061910ai          NAT: A.CED.A.1          TOP: Modeling Linear Inequalities
399  ANS: 3

$\sqrt{16} + \sqrt{9} = \frac{7}{1}$ may be expressed as the ratio of two integers.

     REF: 061413ai          NAT: N.RN.B.3          TOP: Operations with Radicals
     KEY: classify

1

400 ANS: 3 REF: 081410ai NAT: F.LE.A.1 TOP: Families of Functions
KEY: bimodalgraph

401 ANS: 1

$$\frac{0.8(10^2) - 0.8(5^2)}{10 - 5} = \frac{80 - 20}{5} = 12$$

REF: 011521ai NAT: F.IF.B.6 TOP: Rate of Change

402 ANS: 1 REF: 061521ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

403 ANS: 4 REF: 011523ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

404 ANS: 3 REF: 061522ai NAT: F.LE.A.2 TOP: Sequences
KEY: recursive

405 ANS: 2

$$d = \frac{1}{2} at^2$$

$$2d = at^2$$

$$\frac{2d}{a} = t^2$$

$$\sqrt{\frac{2d}{a}} = t$$

REF: 061519ai NAT: A.CED.A.4 TOP: Transforming Formulas

406 ANS: 4

$f(1) = 3; f(2) = -5; f(3) = 11; f(4) = -21; f(5) = 43$

REF: 081424ai NAT: F.IF.A.3 TOP: Sequences KEY: recursive

407 ANS: 3 REF: 061412ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

408 ANS: 4 REF: 081503ai NAT: A.SSE.A.1 TOP: Modeling Expressions

409 ANS: 3 REF: 061411ai NAT: S.ID.C.8 TOP: Correlation Coefficient

410 ANS: 1

$25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60$

REF: 011508ai NAT: F.IF.A.2 TOP: Functional Notation

411 ANS: 2

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

REF: 061512ai NAT: A.APR.B.3 TOP: Graphing Polynomial Functions

412  ANS:  4

$$x^2 - 5x = -3$$

$$x^2 - 5x + \frac{25}{4} = \frac{-12}{4} + \frac{25}{4}$$

$$\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$$

REF:  061518ai     NAT:  A.REI.B.4     TOP:  Solving Quadratics
KEY:  completing the square

413  ANS:  2         REF:  061424ai     NAT:  F.LE.A.2     TOP:  Sequences
KEY:  explicit

414  ANS:  4

$$(x + 2)^2 - 25 = 0$$

$$((x + 2) + 5))((x + 2) - 5)) = 0$$

$$x = -7, 3$$

REF:  081418ai     NAT:  A.APR.B.3     TOP:  Zeros of Polynomials

415  ANS:  4         REF:  081505ai     NAT:  A.CED.A.1     TOP:  Modeling Linear Inequalities

416  ANS:  1

$4x - 5(0) = 40$

$$4x = 40$$

$$x = 10$$

REF:  081408ai     NAT:  F.IF.B.4     TOP:  Graphing Linear Functions

417  ANS:  3
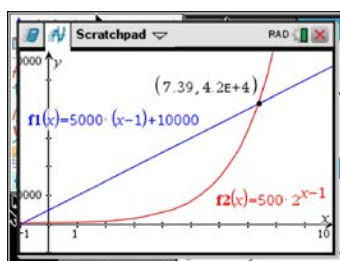


| $x$ | $A = 5000(x - 1) + 10000$ | $B = 500(2)^{x-1}$ |
|---|---|---|
| 6 | 35,000 | 16,000 |
| 7 | 40,000 | 32,000 |
| 8 | 45,000 | 64,000 |
| 9 | 50,000 | 128,000 |

REF:  081518ai     NAT:  F.LE.A.3     TOP:  Families of Functions

418  ANS:  1         REF:  011516ai     NAT:  A.CED.A.4     TOP:  Transforming Formulas

419  ANS:  3         REF:  061415ai     NAT:  F.LE.A.2     TOP:  Families of Functions

420  ANS:  2         REF:  011512ai     NAT:  F.BF.B.3     TOP:  Graphing Polynomial Functions

421  ANS:  1

$$7 - \frac{2}{3}x < x - 8$$

$$15 < \frac{5}{3}x$$

$$9 < x$$

　　　REF:  011507ai　　NAT:  A.REI.B.3　　TOP:  Solving Linear Inequalities
422  ANS:  4　　　　　　REF:  061421ai　　NAT:  F.LE.A.2　　TOP:  Sequences
　　　KEY:  recursive
423  ANS:  3　　　　　　REF:  061504ai　　NAT:  F.IF.A.1　　TOP:  Defining Functions
　　　KEY:  ordered pairs
424  ANS:  1　　　　　　REF:  061507ai　　NAT:  F.IF.C.7　　TOP:  Graphing Step Functions
　　　KEY:  bimodalgraph
425  ANS:  1　　　　　　REF:  081415ai　　NAT:  A.SSE.A.2　　TOP:  Factoring Polynomials
　　　KEY:  higher power
426  ANS:  4

$$y + 3 = 6(0)$$

$$y = -3$$

　　　REF:  011509ai　　NAT:  F.IF.B.4　　TOP:  Graphing Linear Functions
427  ANS:  2　　　　　　REF:  061517ai　　NAT:  F.LE.B.5　　TOP:  Modeling Exponential Functions
428  ANS:  3　　　　　　REF:  081403ai　　NAT:  A.REI.B.4　　TOP:  Solving Quadratics
　　　KEY:  taking square roots
429  ANS:  3　　　　　　REF:  011505ai　　NAT:  F.LE.A.1　　TOP:  Families of Functions
430  ANS:  3

$$\frac{\sqrt{2\left(\frac{1}{2}\right) + 3}}{6\left(\frac{1}{2}\right) - 5} = \frac{\sqrt{4}}{-2} = \frac{2}{-2} = -1$$

　　　REF:  081512ai　　NAT:  F.IF.A.2　　TOP:  Functional Notation
431  ANS:  2　　　　　　REF:  061508ai　　NAT:  N.RN.B.3　　TOP:  Operations with Radicals
　　　KEY:  classify
432  ANS:  2　　　　　　REF:  061416ai　　NAT:  A.CED.A.1　　TOP:  Modeling Linear Equations
433  ANS:  3　　　　　　REF:  011515ai　　NAT:  F.LE.B.5　　TOP:  Modeling Exponential Functions
434  ANS:  3　　　　　　REF:  081409ai　　NAT:  A.CED.A.1　　TOP:  Modeling Quadratics
435  ANS:  2　　　　　　REF:  011502ai　　NAT:  N.Q.A.1　　TOP:  Conversions
　　　KEY:  dimensional analysis

436 ANS: 1

$f(2) = 0$

$f(6) = 8$

REF: 081411ai    NAT: F.IF.A.2    TOP: Domain and Range
KEY: limited domain

437 ANS: 1

$x^2 - 6x = 19$

$x^2 - 6x + 9 = 19 + 9$

$(x - 3)^2 = 28$

$x - 3 = \pm\sqrt{4 \cdot 7}$

$x = 3 \pm 2\sqrt{7}$

REF: fall1302ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: quadratic formula

438 ANS: 2    REF: 081413ai    NAT: A.CED.A.2    TOP: Graphing Linear Functions
KEY: bimodalgraph

439 ANS: 4    REF: 061422ai    NAT: A.CED.A.2    TOP: Modeling Linear Equations

440 ANS: 4    REF: 061509ai    NAT: F.IF.A.2    TOP: Domain and Range
KEY: graph

441 ANS: 2

$(x + 4)(x + 6) = 0$

$x^2 + 10x + 24 = 0$

REF: spr1303ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

442 ANS: 1    REF: 081514ai    NAT: F.LE.A.2    TOP: Sequences
KEY: recursive

443 ANS: 3    REF: 081507ai    NAT: F.BF.A.1    TOP: Modeling Exponential Functions

444 ANS: 4    REF: 081508ai    NAT: A.CED.A.2    TOP: Modeling Linear Equations

445 ANS: 1    REF: 081417ai    NAT: F.BF.B.3    TOP: Graphing Polynomial Functions

446 ANS: 1    REF: 061420ai    NAT: F.IF.A.2    TOP: Functional Notation

447 ANS: 1

$$\frac{7}{3}\left(x+\frac{9}{28}\right)=20$$

$$\frac{7}{3}x+\frac{3}{4}=\frac{80}{4}$$

$$\frac{7}{3}x=\frac{77}{4}$$

$$x=\frac{33}{4}=8.25$$

REF: 061405ai    NAT: A.REI.B.3    TOP: Solving Linear Equations
KEY: fractional expressions

448 ANS: 2

$$P(x)=-0.5x^2+800x-100-(300x+250)=-0.5x^2+500x-350$$

REF: 081406ai    NAT: F.BF.A.1    TOP: Operations with Functions

449 ANS: 3    REF: 011513ai    NAT: A.CED.A.1    TOP: Modeling Linear Inequalities

450 ANS: 3
Median remains at 1.4.

REF: 061520ai    NAT: S.ID.A.3    TOP: Central Tendency and Dispersion

451 ANS: 2    REF: 081422ai    NAT: F.IF.C.7    TOP: Graphing Piecewise-Defined Functions

452 ANS: 2

$$L+S=20 \qquad 27.98L+10.98(20-L)=355.60$$

$$27.98L+10.98S=355.60 \quad 27.98L+219.60-10.98L=355.60$$

$$17L=136$$

$$L=8$$

REF: 081510ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

453 ANS: 1    REF: 011524ai    NAT: A.APR.B.3    TOP: Graphing Polynomial Functions

454 ANS: 3

|  | Mean | Q1 | Median | Q3 | IQR |
|---|---|---|---|---|---|
| Semester 1 | 86.8 | 80.5 | 88 | 92.5 | 12 |
| Semester 2 | 87 | 80 | 88 | 92 | 12 |

REF: 061419ai    NAT: S.ID.A.2    TOP: Central Tendency and Dispersion

455 ANS: 2    REF: 081501ai    NAT: F.BF.B.3    TOP: Graphing Polynomial Functions

456 ANS: 3
$15>5$

REF: 081502ai    NAT: A.REI.C.6    TOP: Graphing Linear Systems

457 ANS: 2    REF: 081516ai    NAT: F.IF.C.7    TOP: Graphing Piecewise-Defined Functions
KEY: bimodalgraph

458  ANS: 1

$$x^2 - 8x + 16 = 24 + 16$$

$$(x - 4)^2 = 40$$

$$x - 4 = \pm\sqrt{40}$$

$$x = 4 \pm 2\sqrt{10}$$

REF: 061523ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: completing the square

459  ANS: 1

$$\frac{110 - 40}{2 - 1} > \frac{350 - 230}{8 - 6}$$

$$70 > 60$$

REF: 061418ai     NAT: F.IF.B.6     TOP: Rate of Change

460  ANS: 2

$$x^2 - 6x = 12$$

$$x^2 - 6x + 9 = 12 + 9$$

$$(x - 3)^2 = 21$$

REF: 061408ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: completing the square

461  ANS: 3          REF: spr1302ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

462  ANS: 2

$$\frac{1}{\sqrt{4}} + \frac{1}{\sqrt{9}} = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

REF: 081522ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

463  ANS: 3          REF: 011518ai     NAT: A.REI.D.11     TOP: Other Systems

464  ANS: 4          REF: spr1304ai     NAT: A.CED.A.1     TOP: Geometric Applications of Quadratics

465  ANS: 2          REF: 081402ai     NAT: F.LE.B.5     TOP: Modeling Linear Functions

466  ANS: 1

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

REF: 061423ai     NAT: A.CED.A.4     TOP: Transforming Formulas

467 ANS: 2       REF: 061403ai       NAT: A.APR.A.1       TOP: Operations with Polynomials
KEY: subtraction

468 ANS: 3

A correlation coefficient close to –1 or 1 indicates a good fit. For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the *x*-axis.

REF: fall1303ai       NAT: S.ID.B.6       TOP: Residuals

469 ANS: 3       REF: 081412ai       NAT: F.LE.A.1       TOP: Families of Functions

470 ANS: 2

$(4,3)$ is on the boundary of $y > -\dfrac{1}{2}x + 5$, so $(4,3)$ is not a solution of the system.

REF: fall1301ai       NAT: A.REI.D.12       TOP: Graphing Systems of Linear Inequalities
KEY: solution set

471 ANS: 1       REF: 081515ai       NAT: F.IF.B.6       TOP: Rate of Change

472 ANS: 4       REF: 081405ai       NAT: A.REI.D.10       TOP: Identifying Solutions

473 ANS: 2

$$x^2 - 2x - 8 = \frac{1}{4}x - 1$$

$$4x^2 - 8x - 32 = x - 4$$

$$4x^2 - 9x - 28 = 0$$

$$(4x + 7)(x - 4) = 0$$

$$x = -\frac{7}{4}, 4$$

REF: 081517ai       NAT: A.REI.D.11       TOP: Quadratic-Linear Systems

474 ANS: 1       REF: 081407ai       NAT: A.REI.D.12       TOP: Graphing Systems of Linear Inequalities
KEY: solution set

475 ANS: 3       REF: 011522ai       NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares       KEY: higher power

476 ANS: 3

$$f(0 + 1) = -2f(0) + 3 = -2(2) + 3 = -1$$

$$f(1 + 1) = -2f(1) + 3 = -2(-1) + 3 = 5$$

REF: 011520ai       NAT: F.IF.A.3       TOP: Sequences       KEY: recursive

477 ANS: 2       REF: 011506ai       NAT: F.IF.B.5       TOP: Domain and Range

478 ANS: 1

$$f(x) = (x + 2)(x + 4)(x - 1)$$

REF: 081504ai       NAT: A.APR.B.3       TOP: Graphing Polynomial Functions

479 ANS: 4

$$3x^2 - 3x - 6 = 0$$

$$3(x^2 - x - 2) = 0$$

$$3(x - 2)(x + 1) = 0$$

$$x = 2, -1$$

REF: 081513ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

480 ANS: 3    REF: 081506ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: bimodalgraph | graph

481 ANS: 4
There are no negative or fractional cars.

REF: 061402ai    NAT: F.IF.B.5    TOP: Domain and Range

482 ANS: 4    REF: 061502ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

483 ANS: 2

$$0 = -16t^2 + 144$$

$$16t^2 = 144$$

$$t^2 = 9$$

$$t = 3$$

REF: 081423ai    NAT: F.IF.B.5    TOP: Domain and Range

484 ANS: 4

$$3(x^2 - 4x + 4) - 2x + 2 = 3x^2 - 12x + 12 - 2x + 2 = 3x^2 - 14x + 14$$

REF: 081524ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: multiplication

485 ANS: 3

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

REF: 061511ai    NAT: F.IF.B.6    TOP: Rate of Change

486 ANS: 2    REF: 061404ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: bimodalgraph | graph

487 ANS: 3    REF: 061407ai    NAT: F.LE.B.5    TOP: Modeling Linear Functions

488 ANS: 1

$$x^2 - 12x + 7$$

$$x^2 - 12x + 36 - 29$$

$$(x - 6)^2 - 29$$

REF: 081520ai    NAT: F.IF.C.8    TOP: Vertex Form of a Quadratic

489 ANS: 4

$$x^2 - 13x - 30 = 0$$

$$(x - 15)(x + 2) = 0$$

$$x = 15, -2$$

REF: 061510ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

490 ANS: 4

1) $\dfrac{g(1) - g(-1)}{1 - -1} = \dfrac{4 - 6}{2} = \dfrac{-2}{2} = -1$   2) $g(0) = 6$   3) $x = \dfrac{-(-1)}{2(-1)} = -\dfrac{1}{2}$;   $g\left(-\dfrac{1}{2}\right) = -\left(-\dfrac{1}{2}\right)^2 + \dfrac{1}{2} + 6 = 6\dfrac{1}{4}$

$\dfrac{n(1) - n(-1)}{1 - -1} = \dfrac{9 - 5}{2} = \dfrac{4}{2} = 2$      $n(0) = 8$      $x = 1; n(1) = 9$

4) $g: S = \dfrac{-(-1)}{-1} = -1$

$n: S = -2 + 4 = 2$

REF: 081521ai    NAT: F.IF.C.9    TOP: Comparing Functions

491 ANS: 4

$$16^{2t} = n^{4t}$$

$$(16^2)^t = (n^4)^t$$

$$((4^2)^2)^t = ((n^2)^2)^t$$

REF: 011519ai    NAT: A.SSE.B.3    TOP: Modeling Exponential Functions

492 ANS: 3

$a + p = 165$      $1.75(165 - p) + 2.5p = 337.5$

$1.75a + 2.5p = 337.5$   $288.75 - 1.75p + 2.5p = 337.5$

$$0.75p = 48.75$$

$$p = 65$$

REF: 061506ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

493 ANS: 2        REF: 081416ai    NAT: F.LE.A.2    TOP: Sequences
KEY: explicit

494 ANS: 4

$$x^2 + 6x = 7$$

$$x^2 + 6x + 9 = 7 + 9$$

$$(x + 3)^2 = 16$$

REF: 011517ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

495 ANS: 4        REF: 011503ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: factoring

496  ANS:  3

|  | Company 1 | Company 2 |
|---|---|---|
| median salary | 33,500 | 36,250 |
| mean salary | 33,750 | 44,125 |
| salary range | 8,000 | 36,000 |
| mean age | 28.25 | 28.25 |

REF:  081404ai     NAT:  S.ID.A.2     TOP:  Central Tendency and Dispersion

497  ANS:  4        REF:  081421ai     NAT:  S.ID.B.6     TOP:  Regression
KEY:  linear

498  ANS:  4

$$\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.$$

REF:  081414ai     NAT:  F.IF.B.6     TOP:  Rate of Change

499  ANS:  1

$$\frac{x - 2}{3} = \frac{4}{6}$$

$$6x - 12 = 12$$

$$6x = 24$$

$$x = 4$$

REF:  081420ai     NAT:  A.REI.B.3     TOP:  Solving Linear Equations
KEY:  fractional expressions

500  ANS:  1        REF:  011504ai     NAT:  F.BF.A.1     TOP:  Modeling Exponential Functions

501  ANS:  4

$$m = \frac{11 - 1}{3 - (-2)} = \frac{10}{5} = 2 \quad y = mx + b \quad y = 2x + 5$$

$$11 = 2(3) + b \quad 9 = 2(2) + 5$$

$$5 = b$$

REF:  011511ai     NAT:  A.REI.D.10     TOP:  Writing Linear Equations
KEY:  other forms

502  ANS:  2

$$2(3x - y = 4)$$

$$6x - 2y = 8$$

REF:  061414ai     NAT:  A.REI.C.6     TOP:  Solving Linear Systems

503  ANS:  4        REF:  061406ai     NAT:  F.LE.A.1     TOP:  Families of Functions

504  ANS:  1

$A: \bar{x} = 6; \sigma_x = 3.16 \ B: \bar{x} = 6.875; \sigma_x = 3.06$

REF:  081519ai     NAT:  S.ID.A.2     TOP:  Central Tendency and Dispersion

505 ANS: 4

$\dfrac{1}{3}$ of a positive number +9 is a positive number.

REF: 061417ai    NAT: F.IF.A.2    TOP: Domain and Range
KEY: real domain, linear

506 ANS: 3

$h(x) = -x^2 + x + 6$    Maximum of $f(x) = 9$   $k(x) = -5x^2 - 12x + 4$    Maximum of $g(x) < 5$

$$x = \dfrac{-1}{2(-1)} = \dfrac{1}{2}$$

$$x = \dfrac{12}{2(-5)} = -\dfrac{6}{5}$$

$$y = -\left(\dfrac{1}{2}\right)^2 + \dfrac{1}{2} + 6$$

$$y = -5\left(-\dfrac{6}{5}\right)^2 - 12\left(-\dfrac{6}{5}\right) + 4$$

$$= -\dfrac{1}{4} + \dfrac{2}{4} + 6$$

$$= -\dfrac{36}{5} + \dfrac{72}{5} + \dfrac{20}{5}$$

$$= 6\dfrac{1}{4}$$

$$= \dfrac{56}{5}$$

$$= 11\dfrac{1}{5}$$

REF: 061514ai    NAT: F.IF.C.9    TOP: Comparing Functions

507 ANS: 4    REF: 011514ai    NAT: S.ID.A.2    TOP: Central Tendency and Dispersion

508 ANS: 1
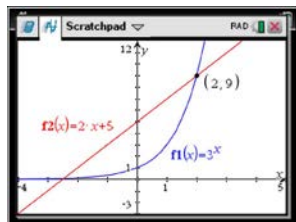


$f(-1) < g(-1)$

$3^{-1} < 2(-1) + 5$

$\dfrac{1}{3} < 3$

REF: 061515ai    NAT: F.LE.A.3    TOP: Families of Functions

509 ANS: 1    REF: 081401ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

510 ANS: 3    REF: 061409ai    NAT: F.IF.B.4    TOP: Graphing Quadratic Functions
KEY: context

511 ANS: 2    REF: 011510ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: multiplication

# Algebra I 2 Point Regents Exam Questions
# Answer Section

512 ANS:
$y = 0.05x - 0.92$

REF: fall1307ai     NAT: S.ID.B.6     TOP: Regression     KEY: linear

513 ANS:

$g$. The maximum of $f$ is 6. For $g$, the maximum is 11. $x = \dfrac{-b}{2a} = \dfrac{-4}{2\left(-\dfrac{1}{2}\right)} = \dfrac{-4}{-1} = 4$

$$y = -\frac{1}{2}(4)^2 + 4(4) + 3 = -8 + 16 + 3 = 11$$

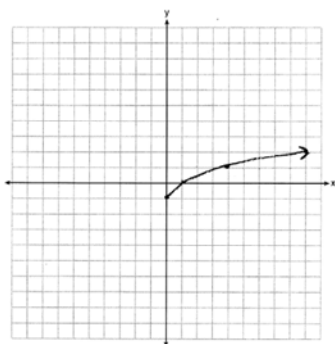REF: 081429ai     NAT: F.IF.C.9     TOP: Comparing Functions

514 ANS:
$4y - 12 \le 8y + 4$

$-16 \le 4y$

$-4 \le y$

REF: 062125ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

515 ANS:
6. $3x + 9 \le 5x - 3$

$12 \le 2x$

$6 \le x$

REF: 081430ai     NAT: A.REI.B.3     TOP: Interpreting Solutions

516 ANS:



REF: 061425ai     NAT: F.IF.C.7     TOP: Graphing Root Functions

517 ANS:
No. The product of $\sqrt{8}$ and $\sqrt{2}$, which are both irrational numbers, is $\sqrt{16}$, which is rational.

REF: 081930ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

518 ANS:
Yes, because from the graph the zeroes of $f(x)$ are $-2$ and 3.

REF: 011832ai    NAT: F.IF.C.7    TOP: Graphing Quadratic Functions

519 ANS:

Since $(x+p)^2 = x^2 + 2px + p^2$, $p$ is half the coefficient of $x$, and the constant term is equal to $p^2$. $\left(\dfrac{6}{2}\right)^2 = 9$

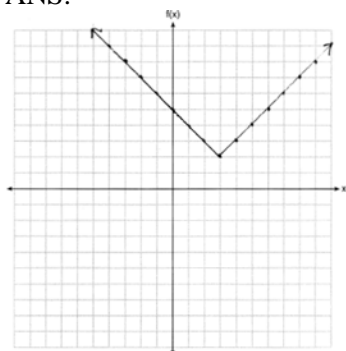REF: 081432ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

520 ANS:
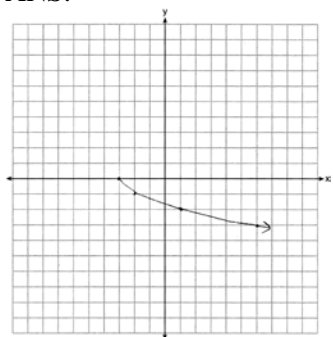


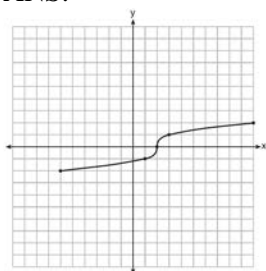REF: 081625ai    NAT: F.IF.C.7    TOP: Graphing Root Functions

521 ANS:



REF: 011825ai    NAT: F.IF.C.7    TOP: Graphing Absolute Value Functions

522 ANS:
$\dfrac{480 - 140}{7 - 2} = 68 \text{ mph}$

REF: 011731ai    NAT: F.IF.B.6    TOP: Rate of Change

523 ANS:



REF: fall1304ai     NAT: F.IF.C.7     TOP: Graphing Root Functions

524 ANS:

$$F_g = \frac{GM_1 M_2}{r^2}$$

$$r^2 = \frac{GM_1 M_2}{F_g}$$

$$r = \sqrt{\frac{GM_1 M_2}{F_g}}$$

REF: 011830ai     NAT: A.CED.A.4     TOP: Transforming Formulas

525 ANS:

$$(2x^2 + 7x - 10)(x + 5)$$

$$2x^3 + 7x^2 - 10x + 10x^2 + 35x - 50$$

$$2x^3 + 17x^2 + 25x - 50$$

REF: 081428ai     NAT: A.APR.A.1     TOP: Operations with Polynomials
KEY: multiplication

526 ANS:

$7 - \sqrt{2}$ is irrational because it can not be written as the ratio of two integers.

REF: 061727ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

527 ANS:

$f(5) = (8) \cdot 2^5 = 256$     $f(t) = g(t)$

$g(5) = 2^{5+3} = 256$     $(8) \cdot 2^t = 2^{t+3}$

$$2^3 \cdot 2^t = 2^{t+3}$$

$$2^{t+3} = 2^{t+3}$$

REF: 011632ai     NAT: A.SSE.B.3     TOP: Modeling Exponential Functions

528 ANS:
$6x^2 - 6xy - (3x^2 - 6xy) = 3x^2$

REF: 062228ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
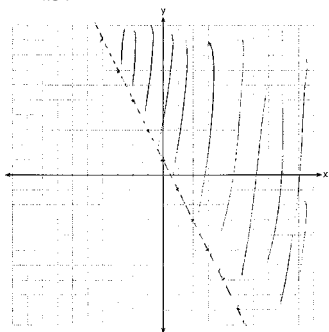KEY: subtraction

529 ANS:
$15x + 36 = 10x + 48$

$5x = 12$

$x = 2.4$

REF: 011531ai    NAT: A.CED.A.1    TOP: Modeling Linear Equations

530 ANS:



REF: 081526ai    NAT: A.REI.D.12    TOP: Graphing Linear Inequalities

531 ANS:
$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16$ None

REF: 081529ai    NAT: A.REI.B.4    TOP: Using the Discriminant

532 ANS:
$-3, 1$

REF: 081630ai    NAT: A.REI.D.11    TOP: Other Systems

533 ANS:
$a_2 = 2(3 + 1) = 8$  $a_3 = 2(8 + 1) = 18$  $a_4 = 2(18 + 1) = 38$

REF: 061931ai    NAT: F.IF.A.3    TOP: Sequences    KEY: recursive

534 ANS:

No, because the point $(0, 4)$ does not satisfy the inequality $y < \frac{1}{2}x + 4$.  $4 < \frac{1}{2}(0) + 4$ is not a true statement.

REF: 011828ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: solution set

535 ANS:

$2x^2 + 5x - 42 = 0$       Agree, as shown by solving the equation by factoring.

$(x + 6)(2x - 7) = 0$

$$x = -6, \frac{7}{2}$$

REF: 061628ai       NAT: A.REI.B.4       TOP: Solving Quadratics
KEY: factoring

536 ANS:

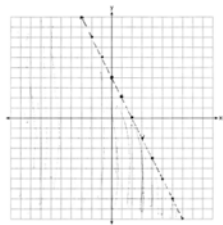Exponential, because the function does not grow at a constant rate.

REF: 081527ai       NAT: F.LE.A.1       TOP: Families of Functions

537 ANS:

0.5 represents the rate of decay and 300 represents the initial amount of the compound.

REF: 061426ai       NAT: F.LE.B.5       TOP: Modeling Exponential Functions

538 ANS:

    $y < -2x + 4$

REF: 061730ai       NAT: A.REI.D.12   TOP: Graphing Linear Inequalities

539 ANS:

$$\frac{2}{40} = \frac{5.75}{x} \quad \frac{5280}{115} \approx 46$$

$x = 115$

REF: 081730ai       NAT: N.Q.A.2       TOP: Using Rate

540 ANS:
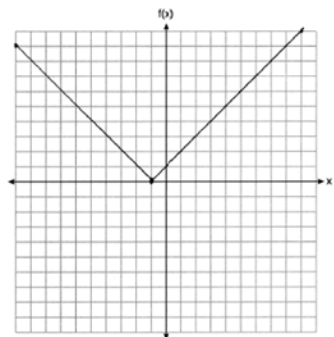


REF: 082225ai       NAT: F.IF.C.7       TOP: Graphing Absolute Value Functions

541 ANS:
Domain is reals.  Range is $y \geq 3$.

REF:  062229ai          NAT:  F.IF.A.2          TOP:  Domain and Range

542 ANS:
No.  He found another point if $g(x)$ were a linear function.

REF:  062129ai          NAT:  F.LE.A.2          TOP:  Modeling Exponential Functions
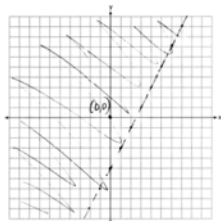
543 ANS:
Yes, because every element of the domain is assigned one unique element in the range.

REF:  061430ai          NAT:  F.IF.A.1          TOP:  Defining Functions
KEY:  ordered pairs

544 ANS:
$g(x)$ is $f(x)$ shifted right by $a$, $h(x)$ is $f(x)$ shifted down by $a$.

REF:  061732ai          NAT:  F.BF.B.3          TOP:  Graphing Absolute Value Functions

545 ANS:



REF:  011729ai          NAT:  A.REI.D.12   TOP:  Graphing Linear Inequalities

546 ANS:
translate 2 left

REF:  082230ai          NAT:  F.BF.B.3          TOP:  Graphing Polynomial Functions

547 ANS:

$$\frac{5 \pm \sqrt{(-5)^2 - 4(3)(-7)}}{2(3)} = \frac{5 \pm \sqrt{109}}{6} \approx -0.9, 2.6$$

REF:  082231ai          NAT:  A.REI.B.4          TOP:  Solving Quadratics
KEY:  quadratic formula

548 ANS:
$3x^3 + 21x^2 + 36x = 0$

$3x(x^2 + 7x + 12) = 0$

$3x(x + 4)(x + 3) = 0$

$x = 0, -4, -3$

REF:  011930ai          NAT:  A.APR.B.3          TOP:  Zeros of Polynomials

549 ANS:
Neither is correct. Nora's reason is wrong since a circle is not a function because it fails the vertical line test. Mia is wrong since a circle is not a function because multiple values of $y$ map to the same $x$-value.

REF: 011732ai    NAT: F.IF.A.1    TOP: Defining Functions
KEY: graphs

550 ANS:
$B = 3000(1.042)^t$

REF: 081426ai    NAT: F.BF.A.1    TOP: Modeling Exponential Functions

551 ANS:
$$4x^2 - 12x - 7 = 0$$
$$(4x^2 - 14x) + (2x - 7) = 0$$
$$2x(2x - 7) + (2x - 7) = 0$$
$$(2x + 1)(2x - 7) = 0$$
$$x = -\frac{1}{2}, \frac{7}{2}$$

REF: 011529ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: factoring

552 ANS:
$$6x^2 = 42$$
$$x^2 = 7$$
$$x = \pm\sqrt{7}$$

REF: 081931ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: taking square roots

553 ANS:
$$9K = 5F + 2298.35$$
$$F = \frac{9K - 2298.35}{5}$$

REF: 081829ai    NAT: A.CED.A.4    TOP: Transforming Formulas

554 ANS:
$$3600 + 1.02x < 2000 + 1.04x$$
$$1600 < 0.02x$$
$$80000 < x$$

REF: 011925ai    NAT: A.REI.B.3    TOP: Solving Linear Inequalities

555 ANS:
Graph $f(x)$ and find $x$-intercepts, $-3, 1, 8$.

REF: 081825ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

556 ANS:
$(x - 3)^2 - 49 = 0$

$\qquad (x - 3)^2 = 49$

$\qquad\quad x - 3 = \pm 7$

$\qquad\qquad x = -4, 10$

REF: 081631ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

557 ANS:
$185 + 0.03x = 275 + 0.025x$

$\qquad 0.005x = 90$

$\qquad\qquad x = 18000$

REF: 081427ai     NAT: A.REI.C.6     TOP: Solving Linear Systems
KEY: substitution

558 ANS:
$(2w)(w) = 34$

$\qquad w^2 = 17$

$\qquad w \approx 4.1$

REF: 061532ai     NAT: A.CED.A.1     TOP: Geometric Applications of Quadratics

559 ANS:
Graph A is a good fit because it does not have a clear pattern, whereas Graph B does.

REF: 061531ai     NAT: S.ID.B.6     TOP: Residuals

560 ANS:
$3y^2 - 12y - 288$

$3(y^2 - 4y - 96)$

$3(y - 12)(y + 8)$

REF: 082232ai     NAT: A.SSE.A.2     TOP: Factoring Polynomials

561 ANS:
$\dfrac{m}{351} = \dfrac{70}{70 + 35}$

$105m = 24570$

$\quad m = 234$

REF: 011630ai     NAT: S.ID.B.5     TOP: Frequency Tables
KEY: two-way

562  ANS:
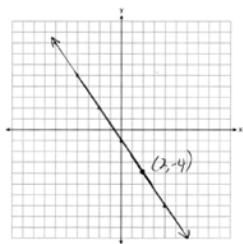


REF:  081927ai     NAT:  F.IF.B.4     TOP:  Graphing Linear Functions

563  ANS:
$f(x) = 6.50x + 4(12)$

REF:  061526ai     NAT:  F.BF.A.1     TOP:  Modeling Linear Functions

564  ANS:

$$\frac{S}{180} = n - 2$$

$$\frac{S}{180} + 2 = n$$

REF:  061631ai     NAT:  A.CED.A.4    TOP:  Transforming Formulas

565  ANS:
$$C = 3x^2 + 4 - 3\left(2x^2 + 6x - 5\right) = 3x^2 + 4 - 6x^2 - 18x + 15 = -3x^2 - 18x + 19$$

REF:  061926ai     NAT:  A.APR.A.1    TOP:  Operations with Polynomials
KEY:  subtraction

566  ANS:
$$y^2 - 6y + 9 = 4y - 12$$
$$y^2 - 10y + 21 = 0$$
$$(y - 7)(y - 3) = 0$$
$$y = 7, 3$$

REF:  011627ai     NAT:  A.REI.B.4    TOP:  Solving Quadratics
KEY:  factoring

567  ANS:
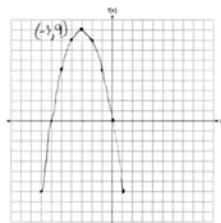


REF:  061726ai     NAT:  F.IF.B.4     TOP:  Graphing Quadratic Functions
KEY:  no context

568 ANS:
Yes, because the sequence has a common ratio, 3.

REF: 081726ai     NAT: F.IF.A.3     TOP: Sequences     KEY: difference or ratio

569 ANS:
$5x^2 - 10$

REF: 061725ai     NAT: A.APR.A.1     TOP: Operations with Polynomials
KEY: subtraction

570 ANS:
$x^2 + 46 = 60 + 5x$  John and Sarah will have the same amount of money saved at 7 weeks.  I set the

$x^2 - 5x - 14 = 0$

$(x - 7)(x + 2) = 0$

$x = 7$

expressions representing their savings equal to each other and solved for the positive value of $x$ by factoring.

REF: 061527ai     NAT: A.REI.D.11     TOP: Quadratic-Linear Systems

571 ANS:
Irrational, as 89 is not a perfect square.  $3^2 - 4(2)(-10) = 89$

REF: 081828ai     NAT: A.REI.B.4     TOP: Using the Discriminant

572 ANS:
The rate of speed is expressed in $\dfrac{\text{feet}}{\text{minute}}$ because speed$=\dfrac{\text{distance}}{\text{time}}$.

REF: 011827ai     NAT: A.CED.A.2     TOP: Speed

573 ANS:
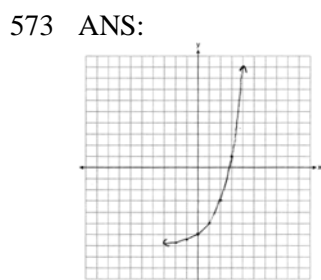


Yes, $f(4) > g(4)$ because $2^4 - 7 > 1.5(4) - 3$.

REF: 011929ai     NAT: F.IF.C.7     TOP: Graphing Exponential Functions

574 ANS:
$x^2 = x$

$x^2 - x = 0$

$x(x - 1) = 0$

$x = 0, 1$

REF: 061731ai     NAT: A.REI.D.11     TOP: Quadratic-Linear Systems

575  ANS:
Yes, because $f(x)$ does not have a constant rate of change.

REF: 061826ai     NAT: F.LE.A.1     TOP: Families of Functions

576  ANS:
$\dfrac{33-1}{12-1} \approx 2.9$  $\dfrac{36-11}{15-6} \approx 2.8$  The interval 1 a.m. to 12 noon has the greater rate.

REF: 061929ai     NAT: F.IF.B.6     TOP: Rate of Change

577  ANS:
$18 - 2(x+5) = 12x$

$18 - 2x - 10 = 12x$

$8 = 14x$

$x = \dfrac{8}{14} = \dfrac{4}{7}$

REF: 061830ai     NAT: A.REI.B.3     TOP: Solving Linear Equations
KEY: fractional expressions

578  ANS:
$0, -1, 1, 1, 1$

REF: 081832ai     NAT: F.IF.A.3     TOP: Sequences     KEY: recursive

579  ANS:
$5x + 4x^2(2x+7) - 6x^2 - 9x = -4x + 8x^3 + 28x^2 - 6x^2 = 8x^3 + 22x^2 - 4x$

REF: 081731ai     NAT: A.APR.A.1     TOP: Operations with Polynomials
KEY: multiplication

580  ANS:
3 right and 4 down.

REF: 062226ai     NAT: F.BF.B.3     TOP: Graphing Polynomial Functions

581  ANS:
$\dfrac{2}{3} < \dfrac{x}{5}$

$\dfrac{10}{3} < x$

REF: 081929ai     NAT: A.REI.B.3     TOP: Solving Linear Inequalities

582  ANS:
Los Angeles because range, IQR and $\sigma_x$ are less.

|             | $\sigma_x$ | Min | Q1 | Q3 | Max | Range | IQR |
| ----------- | ---------- | --- | -- | -- | --- | ----- | --- |
| Miami       | 7.2        | 60  | 75 | 83 | 87  | 27    | 8   |
| Los Angeles | 3.6        | 61  | 63 | 67 | 74  | 13    | 4   |

REF: 011931ai     NAT: S.ID.A.2     TOP: Central Tendency and Dispersion

583  ANS:

$b(x - 3) \geq ax + 7b$

$bx - 3b \geq ax + 7b$

$bx - ax \geq 10b$

$x(b - a) \geq 10b$

$x \leq \dfrac{10b}{b - a}$

REF:  011631ai        NAT:  A.REI.B.3        TOP:  Solving Linear Inequalities

584  ANS:

The data is continuous, i.e. a fraction of a cookie may be eaten.

REF:  081729ai        NAT:  F.IF.B.4        TOP:  Graphing Linear Functions
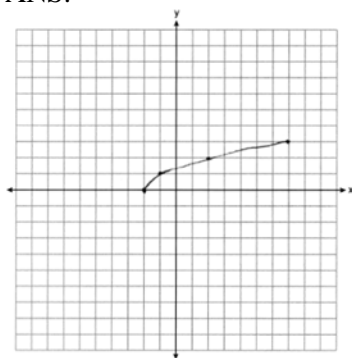
585  ANS:

$-16t^2 + 256 = 0$

$16t^2 = 256$

$t^2 = 16$

$t = 4$

REF:  061829ai        NAT:  F.IF.B.4        TOP:  Graphing Quadratic Functions
KEY:  context

586  ANS:



REF:  061825ai        NAT:  F.IF.C.7        TOP:  Graphing Root Functions

587  ANS:

Plan $A$:  $C = 2G + 25$, Plan $B$:  $C = 2.5G + 15$.  $50 = 2.5G + 15$  $50 = 2G + 25$  With Plan $B$, Dylan can rent 14

$35 = 2.5G$        $25 = 2G$

$G = 14$        $G = 12.5$

games, but with Plan $A$, Dylan can rent only 12.  $65 = 2(20) + 25 = 2.5(20) + 15$  Bobby can choose either plan, as he could rent 20 games for \$65 with both plans.

REF:  081728ai        NAT:  A.CED.A.3        TOP:  Modeling Linear Systems

588 ANS:

$$x^2 - 8x = 5$$

$$x^2 - 8x + 16 = 5 + 16$$

$$(x - 4)^2 = 21$$

$$x - 4 = \pm\sqrt{21}$$

$$x = 4 \pm \sqrt{21}$$

REF: 062232ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

589 ANS:

$$m = \frac{4-1}{-3-6} = \frac{3}{-9} = -\frac{1}{3} \quad y - y_1 = m(x - x_1)$$

$$4 = -\frac{1}{3}(-3) + b \qquad y - 4 = -\frac{1}{3}(x + 3)$$

$$4 = 1 + b$$

$$3 = b$$

$$y = -\frac{1}{3}x + 3$$

REF: 061629ai    NAT: A.REI.D.10    TOP: Writing Linear Equations
KEY: other forms

590 ANS:

$$x = 1 \quad \frac{-3+5}{2} = 1$$

REF: 011829ai    NAT: F.IF.B.4    TOP: Graphing Quadratic Functions
KEY: no context

591 ANS:

$$x^2 - 6x + 9 = 15 + 9$$

$$(x - 3)^2 = 24$$

$$x - 3 = \pm\sqrt{24}$$

$$x = 3 \pm 2\sqrt{6}$$

REF: 081732ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

592 ANS:

$$x^2 - 4x + 3 = 0$$

$$(x - 3)(x - 1) = 0$$

$$x = 1, 3$$

REF: 011826ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

593 ANS:

During 1960-1965 the graph has the steepest slope.

REF: 011628ai     NAT: F.IF.B.6     TOP: Rate of Change

594 ANS:

Distributive and Addition Property of Equality

REF: 012029ai     NAT: A.REI.A.1     TOP: Identifying Properties

595 ANS:

$(-4, 1)$, because then every element of the domain is not assigned one unique element in the range.

REF: 011527ai     NAT: F.IF.A.1     TOP: Defining Functions
KEY: ordered pairs

596 ANS:

No, because the relation does not pass the vertical line test.

REF: 011626ai     NAT: F.IF.A.1     TOP: Defining Functions
KEY: graphs

597 ANS:

$3\sqrt{2} \cdot 8\sqrt{18} = 24\sqrt{36} = 144$ is rational, as it can be written as the ratio of two integers.

REF: 061626ai     NAT: N.RN.B.3     TOP: Operations with Radicals
KEY: classify

598 ANS:

$T(d) = 2d + 28$  $T(6) = 2(6) + 28 = 40$

REF: 081532ai     NAT: F.BF.A.1     TOP: Modeling Linear Functions

599 ANS:

$$f(x) = \left(x^2 - 2x + 1\right) - 8 - 1 = (x - 1)^2 - 9 \ (1, -9)$$

REF: 061932ai     NAT: F.IF.C.8     TOP: Vertex Form of a Quadratic

600 ANS:

There is 2 inches of snow every 4 hours.

REF: 061630ai     NAT: S.ID.C.7     TOP: Modeling Linear Functions

601 ANS:
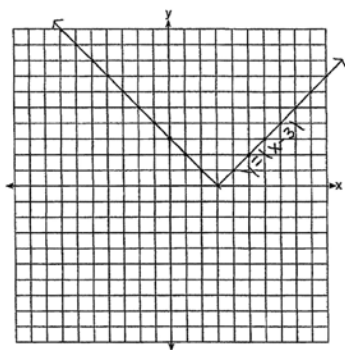


The graph has shifted three units to the right.

REF: 061525ai    NAT: F.BF.B.3    TOP: Graphing Absolute Value Functions

602 ANS:

$A = 600(1.016)^2 \approx 619.35$

REF: 061529ai    NAT: A.CED.A.1    TOP: Modeling Exponential Functions

603 ANS:
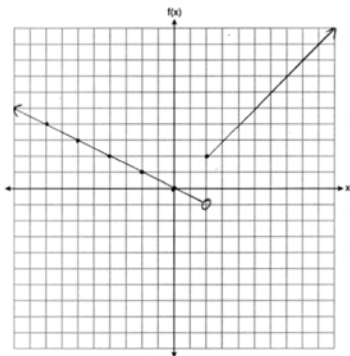


REF: 061832ai    NAT: F.IF.C.7    TOP: Graphing Piecewise-Defined Functions

604 ANS:

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

REF: 081727ai    NAT: A.CED.A.4    TOP: Transforming Formulas

605 ANS:

a)   $p + d \le 800$   b) $6(440) + 9d \ge 5000$   Since $440 + 263 \le 800$, it is possible.

    $6p + 9d \ge 5000$     $2640 + 9d \ge 5000$

                          $9d \ge 2360$

                          $d \ge 262.\overline{2}$

REF: spr1306ai     NAT: A.CED.A.3     TOP: Modeling Systems of Linear Inequalities

606 ANS:
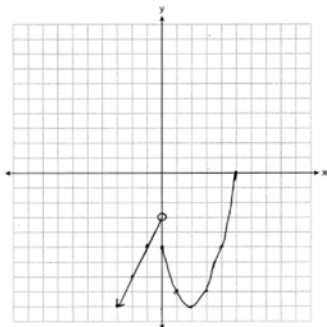


REF: 081932ai     NAT: F.IF.C.7     TOP: Graphing Piecewise-Defined Functions

607 ANS:

2 units right and 3 units down.

REF: 081626ai     NAT: F.BF.B.3     TOP: Transformations with Functions

608 ANS:
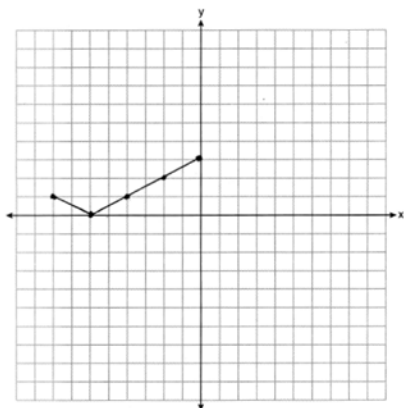


REF: 062126ai     NAT: F.IF.C.7     TOP: Graphing Absolute Value Functions

609  ANS:
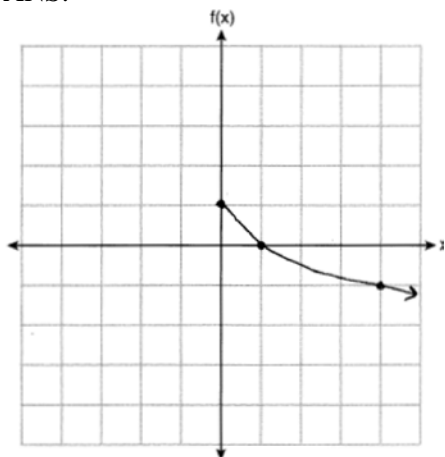


REF:  012025ai       NAT:  F.IF.C.7       TOP:  Graphing Root Functions

610  ANS:

Exponential, as the value decreases by about 47%/year.

REF:  082226ai       NAT:  S.ID.B.6       TOP:  Regression     KEY:  choose model

611  ANS:
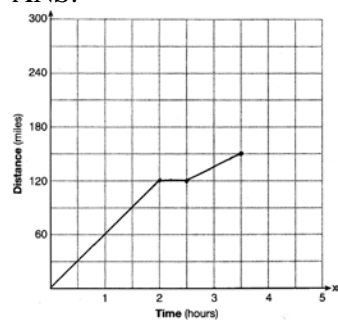


REF:  081528ai       NAT:  F.IF.B.4       TOP:  Relating Graphs to Events

612  ANS:

$x^2(x^2 - 36) = x^2(x + 6)(x - 6)$

REF:  062231ai       NAT:  A.SSE.A.2       TOP:  Factoring the Difference of Perfect Squares

KEY:  higher power

613  ANS:

$x^2 + 10x + 24 = (x + 4)(x + 6) = (x + 6)(x + 4)$.  6 and 4

REF:  081425ai       NAT:  A.REI.B.4       TOP:  Solving Quadratics

KEY:  factoring

614 ANS:

$9C = 5F - 160$

$$F = \frac{9C + 160}{5}$$

REF: 062131ai    NAT: A.CED.A.4    TOP: Transforming Formulas

615 ANS:

$w^2 + 3w - 11 = 0$  $\dfrac{-3 \pm \sqrt{3^2 - 4(1)(-11)}}{2(1)} = \dfrac{-3 \pm \sqrt{53}}{2} \approx -5.14, 2.14$

REF: 062132ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: quadratic formula

616 ANS:

$8m^2 + 20m - 12 = 0$

$4(2m^2 + 5m - 3) = 0$

$(2m - 1)(m + 3) = 0$

$$m = \frac{1}{2}, -3$$

REF: fall1305ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: factoring

617 ANS:

$$\frac{4 \text{ pints}}{\text{day}} \times \frac{2 \text{ cups}}{1 \text{ pint}} \times \frac{8 \text{ ounces}}{1 \text{ cup}} \times \frac{7 \text{ days}}{\text{week}} = \frac{448 \text{ ounces}}{\text{week}}$$

REF: 012027ai    NAT: N.Q.A.1    TOP: Conversions    KEY: dimensional analysis

618 ANS:
$2 < t < 6$ and $14 < t < 15$ because horizontal lines have zero slope.

REF: 011928ai    NAT: F.IF.B.6    TOP: Rate of Change

619 ANS:
Correct. The sum of a rational and irrational is irrational.

REF: 011525ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

620  ANS:

$$x^2 - 8x = -6$$

$$x^2 - 8x + 16 = -6 + 16$$

$$(x - 4)^2 = 10$$

$$x - 4 = \pm\sqrt{10}$$

$$x = 4 \pm \sqrt{10}$$

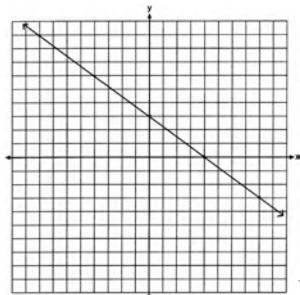REF: 012031ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: completing the square

621  ANS:

Commutative. This property is correct because $x + y = y + x$.

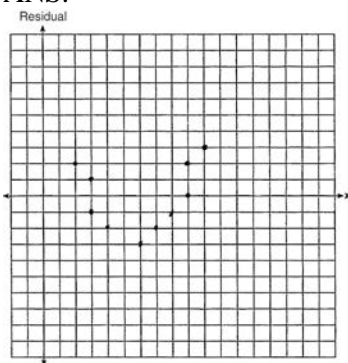REF: 081926ai    NAT: A.REI.A.1    TOP: Identifying Properties

622  ANS:

 No, because $(3, 2)$ is not on the graph.

REF: 061429ai    NAT: F.IF.B.4    TOP: Graphing Linear Functions

623  ANS:

 The line is a poor fit because the residuals form a pattern.

REF: 081431ai    NAT: S.ID.B.6    TOP: Residuals

624  ANS:

4th because IQR and $\sigma_x$ are greater for 4th Period.

REF: 081831ai    NAT: S.ID.A.2    TOP: Central Tendency and Dispersion

625  ANS:

$$4ax + 12 - 3ax = 25 + 3a$$

$$ax = 13 + 3a$$

$$x = \frac{13 + 3a}{a}$$

REF:  081632ai      NAT:  A.CED.A.4    TOP:  Transforming Formulas

626  ANS:

III and IV are functions.  I, for $x = 6$, has two $y$-values.  II, for $x = 1, 2$, has two $y$-values.

REF:  081826ai      NAT:  F.IF.A.1      TOP:  Defining Functions
KEY:  graphs

627  ANS:

The height of the balloon increases 30.5 ft per min.  The balloon starts at a height of 8.7 ft.

REF:  062127ai      NAT:  S.ID.C.7      TOP:  Modeling Linear Functions

628  ANS:

$r \approx 0.92$.  The correlation coefficient suggests a strong positive correlation between a student's mathematics and physics scores.

REF:  011831ai      NAT:  S.ID.C.8      TOP:  Correlation Coefficient

629  ANS:

$$\frac{33 + 12}{180} = 25\%$$

REF:  011526ai      NAT:  S.ID.B.5      TOP:  Frequency Tables
KEY:  two-way

630  ANS:

|  | Watch Sports | Don't Watch Sports | Total |
|---|---|---|---|
| Like Pop | 26 | 28 | 54 |
| Don't Like Pop | 34 | 12 | 46 |
| Total | 60 | 40 | 100 |

REF:  061729ai      NAT:  S.ID.B.5      TOP:  Frequency Tables
KEY:  two-way

631  ANS:

$$at = v_f - v_i$$

$$at + v_i = v_f$$

REF:  081928ai      NAT:  A.CED.A.4    TOP:  Transforming Formulas

632 ANS:

$-3x + 7 - 5x < 15$  0 is the smallest integer.

$$-8x < 8$$

$$x > -1$$

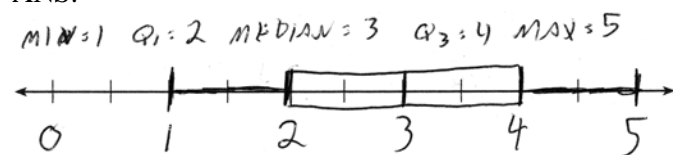REF: 061530ai      NAT: A.REI.B.3      TOP: Interpreting Solutions

633 ANS:

The product is irrational because $\sqrt{27}$ can not be written as the ratio of two integers.

REF: 012030ai      NAT: N.RN.B.3      TOP: Operations with Radicals
KEY: classify

634 ANS:



REF: 061432ai      NAT: S.ID.A.1      TOP: Box Plots      KEY: represent

635 ANS:

Linear, because the function has a constant rate of change.

REF: 011625ai      NAT: F.LE.A.1      TOP: Families of Functions

636 ANS:

Linear, because the function grows at a constant rate.

$$\frac{435-348}{14-13} = \frac{522-435}{15-14} = \frac{609-522}{16-15} = \frac{696-609}{17-16} = \frac{783-696}{18-17} = \frac{87}{1}$$

REF: 011926ai      NAT: F.LE.A.1      TOP: Families of Functions

637 ANS:

$$3x^2 + 21x - 4x - 28 - \frac{1}{4}x^2 = 2.75x^2 + 17x - 28$$

REF: 012028ai      NAT: A.APR.A.1      TOP: Operations with Polynomials
KEY: multiplication

638 ANS:

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi r^2} = h$$

REF: 061930ai      NAT: A.CED.A.4      TOP: Transforming Formulas

639 ANS:

$$\frac{1}{2}x^2 - 4 = 0$$

$$x^2 - 8 = 0$$

$$x^2 = 8$$

$$x = \pm 2\sqrt{2}$$

REF: fall1306ai    NAT: A.APR.B.3    TOP: Zeros of Polynomials

640 ANS:

$1 - 0.95 = 0.05 = 5\%$  To find the rate of decay of an equation in the form $y = ab^x$, subtract $b$ from 1.

REF: 081530ai    NAT: F.LE.B.5    TOP: Modeling Exponential Functions

641 ANS:

$$2(-1) + a(-1) - 7 > -12 \quad a = 2$$

$$-a - 9 > -12$$

$$-a > -3$$

$$a < 3$$

REF: 061427ai    NAT: A.REI.B.3    TOP: Interpreting Solutions

642 ANS:

No.  The sum of a rational and irrational is irrational.

REF: 011728ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

643 ANS:

$$\frac{100 - 40}{4 - 1} = 20$$

REF: 062227ai    NAT: F.IF.B.6    TOP: Rate of Change

644 ANS:

$$(3x^2 - 2x + 5) - (x^2 + 3x - 2) = 2x^2 - 5x + 7$$

$$\frac{1}{2}x^2(2x^2 - 5x + 7) = x^4 - \frac{5}{2}x^3 + \frac{7}{2}x^2$$

REF: 061528ai    NAT: A.APR.A.1    TOP: Operations with Polynomials
KEY: multiplication

645 ANS:

$$-12\left(-\frac{2}{3}(x+12)+\frac{2}{3}x=-\frac{5}{4}x+2\right)$$

$$8(x+12)-8x=15x-24$$

$$8x+96-8x=15x-24$$

$$120=15x$$

$$8=x$$

REF: 061925ai    NAT: A.REI.B.3    TOP: Solving Linear Equations
KEY: fractional expressions

646 ANS:

$6.25a+4.5(45)\le 550$    55 shirts

$$6.25a+202.5\le 550$$

$$6.25a\le 347.50$$

$$a\le 55.6$$

REF: 012026ai    NAT: A.CED.A.1    TOP: Modeling Linear Inequalities

647 ANS:
$h(n)=1.5(n-1)+3$

REF: 081525ai    NAT: F.LE.A.2    TOP: Modeling Linear Functions

648 ANS:
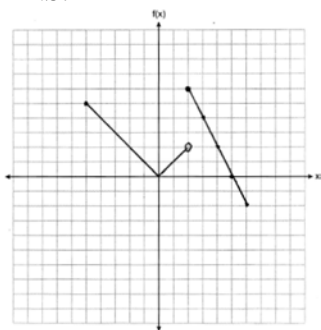


REF: 061927ai    NAT: F.IF.C.7    TOP: Graphing Piecewise-Defined Functions

649 ANS:
$7\sqrt{2}$ is irrational because it can not be written as the ratio of two integers.

REF: 081629ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

650 ANS:
Rational, as $\sqrt{8}\cdot\sqrt{98}=2\sqrt{2}\cdot\sqrt{49}\cdot\sqrt{2}=2\sqrt{2}\cdot 7\sqrt{2}=14\cdot 2=28$, which is the ratio of two integers.

REF: 082227ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

651 ANS:

Rational, as $\sqrt{16} \cdot \dfrac{4}{7} = \dfrac{16}{7}$, which is the ratio of two integers.

REF: 061831ai    NAT: N.RN.B.3    TOP: Operations with Radicals
KEY: classify

652 ANS:

$g(x) = 2(2x+1)^2 - 1 = 2(4x^2 + 4x + 1) - 1 = 8x^2 + 8x + 2 - 1 = 8x^2 + 8x + 1$

REF: 061625ai    NAT: F.BF.A.1    TOP: Operations with Functions

653 ANS:

$x = \dfrac{-1 \pm \sqrt{1^2 - 4(1)(-5)}}{2(1)} = \dfrac{-1 \pm \sqrt{21}}{2} \approx -2.8, 1.8$

REF: 061827ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: quadratic formula

654 ANS:

No, $-2$ is the coefficient of the term with the highest power.

REF: 081628ai    NAT: A.SSE.A.1    TOP: Modeling Expressions

655 ANS:

$g(-2) = -4(-2)^2 - 3(-2) + 2 = -16 + 6 + 2 = -8$

REF: 081925ai    NAT: F.IF.A.2    TOP: Functional Notation

656 ANS:

$(x^2 + 4)(x + 2)(x - 2)$

REF: 062128ai    NAT: A.SSE.A.2    TOP: Factoring the Difference of Perfect Squares
KEY: higher power AI

657 ANS:

$61.5 - 51 = 10.5$

REF: 082228ai    NAT: S.ID.A.2    TOP: Dispersion    KEY: basic

658 ANS:
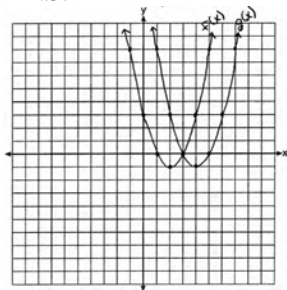


$(4, -1)$. $f(x - 2)$ is a horizontal shift two units to the right.

REF: 061428ai    NAT: F.BF.B.3    TOP: Graphing Polynomial Functions

659 ANS:

$a + b$ is irrational because it cannot be written as the ratio of two integers. $b + c$ is rational because it can be written as the ratio of two integers, $\dfrac{35}{2}$.

REF: 081725ai   NAT: N.RN.B.3   TOP: Operations with Radicals
KEY: classify

660 ANS:

$1.8 - 0.4y \geq 2.2 - 2y$

$\quad 1.6y \geq 0.4$

$\quad\quad y \geq 0.25$

REF: 011727ai   NAT: A.REI.B.3   TOP: Solving Linear Inequalities

661 ANS:

$b = 2(a + 15)$

REF: 082229ai   NAT: A.CED.A.2   TOP: Modeling Linear Equations

662 ANS:

The slope represents the amount paid each month and the $y$-intercept represents the initial cost of membership.

REF: 011629ai   NAT: F.LE.B.5   TOP: Modeling Linear Functions

663 ANS:

$C = 1.29 + .99(s - 1)$   No, because $C = 1.29 + .99(52 - 1) = 51.78$

REF: 011730ai   NAT: A.CED.A.2   TOP: Modeling Linear Equations

664 ANS:

$\dfrac{3.41 - 6.26}{9 - 3} = -0.475$

REF: 081827ai   NAT: F.IF.B.6   TOP: Rate of Change

665 ANS:

$f(x) = x^2 - 14x + 49 - 15 - 49 = (x - 7)^2 - 64$   $(7, -64)$

REF: 062130ai   NAT: F.IF.C.8   TOP: Vertex Form of a Quadratic

666 ANS:

Rational, as $\sqrt{1024} \cdot -3.4 = 32 \cdot -3.4 = -108.8$, which is the ratio of two integers, $\dfrac{-1088}{10}$.

REF: 062225ai   NAT: N.RN.B.3   TOP: Operations with Radicals
KEY: classify

667  ANS:

$12x + 9(2x) + 5(3x) = 15$  $6\left(\dfrac{1}{3}\right) = 2$ pounds

$$45x = 15$$

$$x = \dfrac{1}{3}$$

REF:  spr1305ai     NAT:  A.CED.A.1    TOP:  Modeling Linear Equations

668  ANS:

$x^2 + 4x + 4 = 2 + 4$

$(x + 2)^2 = 6$

$x + 2 = \pm\sqrt{6}$

$x = -2 \pm \sqrt{6}$

REF:  081830ai     NAT:  A.REI.B.4    TOP:  Solving Quadratics
KEY:  completing the square

669  ANS:

$x^2 - 8x - 9 = 0$     I factored the quadratic.

$(x - 9)(x + 1) = 0$

$x = 9, -1$

REF:  011927ai     NAT:  A.REI.B.4    TOP:  Solving Quadratics
KEY:  factoring

670  ANS:

$(2x + 3)(3x - 2) = 0$

$$x = -\dfrac{3}{2}, \dfrac{2}{3}$$

REF:  062230ai     NAT:  A.REI.B.4    TOP:  Solving Quadratics
KEY:  factoring

671  ANS:
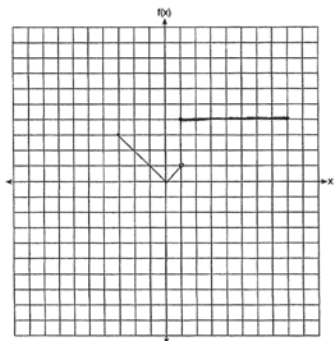


REF:  011530ai     NAT:  F.IF.C.7    TOP:  Graphing Piecewise-Defined Functions

26

672  ANS:
$g(x) = x^3 + 2x^2 - 4$, because $g(x)$ is a translation down 4 units.

REF:  061632ai        NAT:  F.BF.B.3        TOP:  Graphing Polynomial Functions

673  ANS:
Exponential, because the function does not have a constant rate of change.

REF:  081627ai        NAT:  F.LE.A.1        TOP:  Families of Functions

674  ANS:
$12 \text{ km} \left( \dfrac{0.62 \text{ m}}{1 \text{ km}} \right) = 7.44 \text{ m}$   $\dfrac{26.2 \text{ m}}{7.44 \text{ mph}} \approx 3.5 \text{ hours}$

REF:  011726ai        NAT:  N.Q.A.1        TOP:  Conversions    KEY:  dimensional analysis

675  ANS:
$-2x^2 + 6x + 4$

REF:  011528ai        NAT:  A.APR.A.1     TOP:  Operations with Polynomials
KEY:  subtraction

676  ANS:
$2S = n(a + b)$

$\dfrac{2S}{n} = a + b$

$\dfrac{2S}{n} - a = b$

REF:  012032ai        NAT:  A.CED.A.4    TOP:  Transforming Formulas

677  ANS:
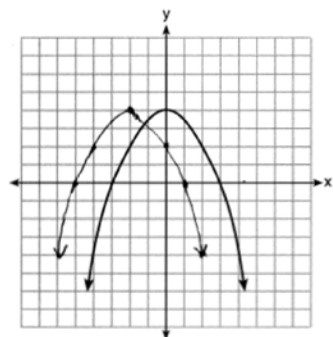


REF:  061828ai        NAT:  F.BF.B.3        TOP:  Transformations with Functions

678  ANS:
No.  There are infinite solutions.

REF:  011725ai        NAT:  A.REI.C.6      TOP:  Solving Linear Systems
KEY:  substitution

679 ANS:

$-16t^2 + 64t = 0$     $0 \le t \le 4$  The rocket launches at $t = 0$ and lands at $t = 4$.

$-16t(t-4) = 0$

$\quad\quad\quad t = 0,4$

REF: 081531ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
KEY: context

680 ANS:

$5x^2 = 180$

$x^2 = 36$

$x = \pm 6$

REF: 061928ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: taking square roots

681 ANS:

$y = 0.25(2)^x$.  I inputted the four integral values from the graph into my graphing calculator and determined the exponential regression equation.

REF: 011532ai     NAT: F.LE.A.2     TOP: Modeling Exponential Functions

682 ANS:

$\quad x^4 + 6x^2 - 7$

$\quad (x^2 + 7)(x^2 - 1)$

$(x^2 + 7)(x + 1)(x - 1)$

REF: 061431ai     NAT: A.SSE.A.2     TOP: Factoring the Difference of Perfect Squares
KEY: higher power

683 ANS:

$4x^2 = 80$

$x^2 = 20$

$x = \pm\sqrt{20}$

REF: 011932ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: taking square roots

684 ANS:

$1 - 0.85 = 0.15 = 15\%$  To find the rate of change of an equation in the form $y = ab^x$, subtract $b$ from 1.

REF: 061728ai     NAT: F.LE.B.5     TOP: Modeling Exponential Functions

685   ANS:
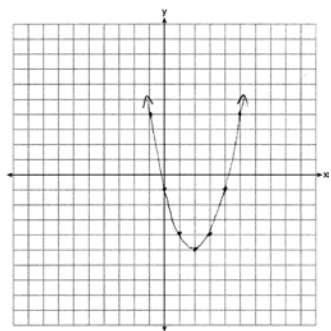


$$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$$

REF:   061627ai      NAT:   F.IF.B.4        TOP:   Graphing Quadratic Functions
KEY:   no context

## Algebra I 4 Point Regents Exam Questions
## Answer Section

686  ANS:

$r \approx 0.94$.  The correlation coefficient suggests that as calories increase, so does sodium.

REF:  011535ai      NAT:  S.ID.C.8      TOP:  Correlation Coefficient

687  ANS:

$(2x + 16)(2x + 12) = 396$.  The length, $2x + 16$, and the width, $2x + 12$, are multiplied and set equal to the area.

$(2x + 16)(2x + 12) = 396$

$4x^2 + 24x + 32x + 192 = 396$

$4x^2 + 56x - 204 = 0$

$x^2 + 14x - 51 = 0$

$(x + 17)(x - 3) = 0$

$x = 3 = \text{width}$

REF:  061434ai      NAT:  A.CED.A.1    TOP:  Geometric Applications of Quadratics

688  ANS:

$A = \dfrac{1}{2} h(b_1 + b_2)$   $b_1 = \dfrac{2(60)}{6} - 12 = 20 - 12 = 8$

$\dfrac{2A}{h} = b_1 + b_2$

$\dfrac{2A}{h} - b_2 = b_1$

REF:  081434ai      NAT:  A.CED.A.4    TOP:  Transforming Formulas

689  ANS:

$\dfrac{V}{\pi h} = \dfrac{\pi r^2 h}{\pi h}$   $d = 2\sqrt{\dfrac{66}{3.3\pi}} \approx 5$

$\dfrac{V}{\pi h} = r^2$

$\sqrt{\dfrac{V}{\pi h}} = r$

REF:  081535ai      NAT:  A.CED.A.4    TOP:  Transforming Formulas

690  ANS:

$y = 80(1.5)^x$   $80(1.5)^{26} \approx 3,030,140$.  No, because the prediction at $x = 52$ is already too large.

REF:  061536ai      NAT:  S.ID.B.6      TOP:  Regression    KEY:  exponential

691 ANS:

$x^2 + 3x - 18 = 0$     The zeros are the *x*-intercepts of $r(x)$.

$(x + 6)(x - 3) = 0$

$x = -6, 3$

REF: 061733ai     NAT: A.APR.B.3     TOP: Zeros of Polynomials

692 ANS:
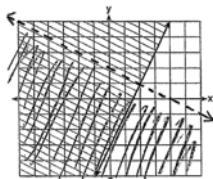


$y \geq 2x - 3$.     Oscar is wrong.  $(2) + 2(1) < 4$ is not true.

REF: 011534ai     NAT: A.REI.D.12     TOP: Graphing Systems of Linear Inequalities
KEY: graph

693 ANS:

$\dfrac{762 - 192}{92 - 32} = \dfrac{570}{60} = 9.5$  $y = 9.5x$  $T = 192 + 9.5(120 - 32) = 1028$

REF: 061635ai     NAT: A.CED.A.2     TOP: Speed

694 ANS:

$0 = (B + 3)(B - 1)$     Janice substituted $B$ for 8$x$, resulting in a simpler quadratic.  Once factored, Janice substituted

$0 = (8x + 3)(8x - 1)$

$x = -\dfrac{3}{8}, \dfrac{1}{8}$

8$x$ for $B$.

REF: 081636ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: factoring

695 ANS:

$y = 836.47(2.05)^x$  The data appear to grow at an exponential rate.  $y = 836.47(2.05)^2 \approx 3515$.

REF: fall1313ai     NAT: S.ID.B.6     TOP: Regression     KEY: choose model

696 ANS:

$f(p) = -.79p + 249.86$  $r = -.95$  There is a strong negative correlation as the higher the sales price, the fewer number of new homes available.

REF: 012035ai     NAT: S.ID.B.6     TOP: Regression     KEY: linear with correlation coefficient

697 ANS:

$8x + 11y \geq 200$  $8x + 11(15) \geq 200$

$8x + 165 \geq 200$

$8x \geq 35$

$x \geq 4.375$

5 hours

REF: fall1309ai    NAT: A.CED.A.3    TOP: Modeling Linear Inequalities

698 ANS:

$w(w + 40) = 6000$

$w^2 + 40w - 6000 = 0$

$(w + 100)(w - 60) = 0$

$w = 60, l = 100$

REF: 081436ai    NAT: A.CED.A.1    TOP: Geometric Applications of Quadratics

699 ANS:

$610 - 55(4) = 390$  $\dfrac{390}{65} = 6$  $4 + 6 = 10$  $610 - 55(2) = 500$  $\dfrac{500}{65} \approx 7.7$  $10 - (2 + 7.7) \approx 0.3$

REF: 081733ai    NAT: A.CED.A.2    TOP: Speed

700 ANS:
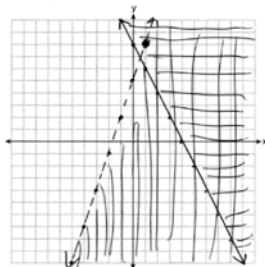


No, $(1, 8)$ falls on the boundary line of $y - 5 < 3x$, which is a strict inequality.

REF: 081933ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: graph

701 ANS:

$w\left(\dfrac{1}{2}w + 6\right) = 432$          $\dfrac{1}{2}w^2 + 6w = 432$  $l = \dfrac{1}{2}(24) + 6 = 18$

$w^2 + 12w - 864 = 0$

$(w - 24)(w + 36) = 0$

$w = 24$

REF: 012036ai    NAT: A.CED.A.1    TOP: Geometric Applications of Quadratics

702 ANS:
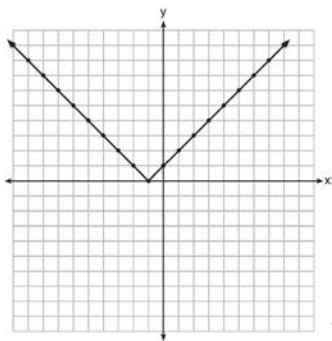


Range: $y \geq 0$. The function is increasing for $x > -1$.

REF: fall1310ai    NAT: F.IF.C.7    TOP: Graphing Absolute Value Functions

703 ANS:

$7x - 3(4x - 8) \leq 6x + 12 - 9x$  6, 7, 8 are the numbers greater than or equal to 6 in the interval.

$$7x - 12x + 24 \leq -3x + 12$$
$$-5x + 24 \leq -3x + 12$$
$$12 \leq 2x$$
$$6 \leq x$$

REF: 081534ai    NAT: A.REI.B.3    TOP: Interpreting Solutions

704 ANS:
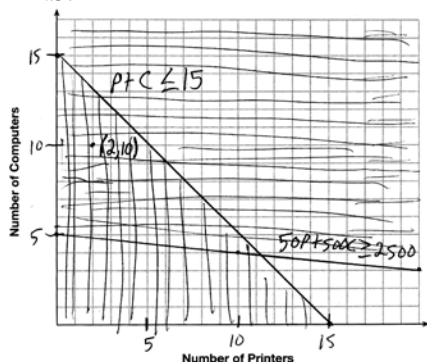


A combination of 2 printers and 10 computers meets all the constraints because $(2, 10)$ is in the solution set of the graph.

REF: 061535ai    NAT: A.CED.A.3    TOP: Modeling Systems of Linear Inequalities

705 ANS:

$A(x) = 5x + 50$  $5x + 50 < 6x + 25$  26 shirts

$B(x) = 6x + 25$        $25 < x$

REF: 061933ai    NAT: A.CED.A.3    TOP: Modeling Linear Inequalities

706 ANS:

$2p + 3d = 18.25$   $4p + 6d = 36.50$   $4p + 2(2.25) = 27.50$

$4p + 2d = 27.50$   $4p + 2d = 27.50$          $4p = 23$

                                $4d = 9$                    $p = 5.75$

                                $d = 2.25$

REF: 011533ai      NAT: A.CED.A.3    TOP: Modeling Linear Systems

707 ANS:

$2.35c + 5.50d = 89.50$   Pat's numbers are not possible: $2.35(8) + 5.50(14) \neq 89.50$                 $c + d = 22$

                                                              $18.80 + 77.00 \neq 89.50$   $2.35c + 5.50(22 - c) = 89.50$

                                                              $95.80 \neq 89.50$   $2.35c + 121 - 5.50c = 89.50$

                                                                                        $-3.15c = -31.50$

                                                                                        $c = 10$

REF: 061436ai      NAT: A.CED.A.3    TOP: Modeling Linear Systems

708 ANS:

There are 20 rabbits at $x = 0$ and they are growing 1.4% per day.   $\dfrac{p(100) - p(50)}{100 - 50} \approx 0.8$

REF: 061833ai      NAT: F.IF.B.6        TOP: Rate of Change

709 ANS:

          $108 = x(24 - x)$   $18 \times 6$

          $108 = 24x - x^2$

$x^2 - 24x + 108 = 0$

$(x - 18)(x - 6) = 0$

          $x = 18, 6$

REF: 011636ai      NAT: A.CED.A.1    TOP: Geometric Applications of Quadratics

710 ANS:

$f(x) = 0.75x + 4.50$.  Each card costs 75¢ and start-up costs were $4.50.

REF: 011735ai      NAT: F.LE.A.2      TOP: Modeling Linear Functions

5

711 ANS:
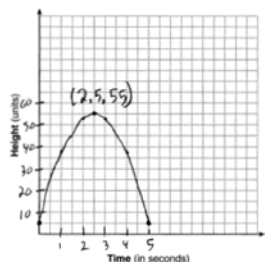


The ball reaches a maximum height of 55 units at 2.5 seconds.

REF: 011736ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
KEY: context

712 ANS:
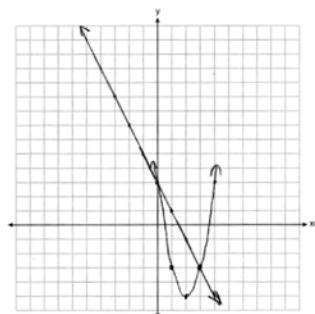


$x = 0, 3$

REF: 061934ai     NAT: A.REI.D.11     TOP: Quadratic-Linear Systems

713 ANS:

$1.25x + 0.55(x + 4) + 0.75(x - 2) = 16$  $1.25x + 0.55x + 2.2 + 0.75x - 1.5 = 16$
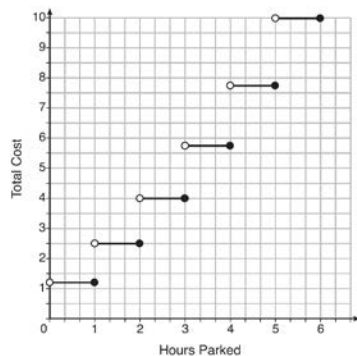
$$2.55x + 0.7 = 16$$

$$2.55x = 15.3$$

$$x = 6$$

REF: 062134ai     NAT: A.CED.A.1     TOP: Modeling Linear Equations

714 ANS:

$V(t) = 25000(0.815)^t$  $V(3) - V(4) \approx 2503.71$

REF: 081834ai     NAT: A.CED.A.1     TOP: Modeling Exponential Functions

715 ANS:



The cost for each additional hour increases after the first 2 hours.

REF: fall1311ai    NAT: F.IF.C.7    TOP: Graphing Step Functions

716 ANS:
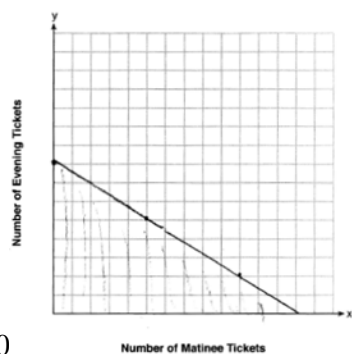


$7.5x + 12.5y \le 100$      13, because $7.5(13) \le 100$ and $7.5(14) > 100$.

REF: 011935ai    NAT: A.REI.D.12    TOP: Graphing Linear Inequalities

717 ANS:

$p + 2s = 15.95$  $5p + 10s = 79.75$

$3p + 5s = 45.90$  $6p + 10s = 91.80$

$p = 12.05$

REF: 011734ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

718 ANS:

$A(t) = 5000(1.012)^t$  $A(32) - A(17) \approx 1200$

REF: 081934ai    NAT: A.CED.A.1    TOP: Modeling Exponential Functions

719 ANS:
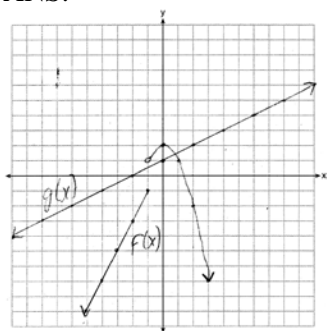
 1, because the graphs only intersect once.

REF: 061636ai     NAT: A.REI.D.11     TOP: Other Systems

720 ANS:
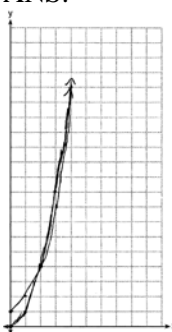
 $g(x)$ has a greater value: $2^{20} > 20^2$

REF: 081533ai     NAT: F.LE.A.3     TOP: Families of Functions

721 ANS:
$p(x) = 0.035x + 300$   $p(8250) = 0.035(8250) + 300 = 588.75$

REF: 011833ai     NAT: F.BF.A.1     TOP: Modeling Linear Functions

722 ANS:

$2x^2 + 3x + 10 = 4x + 32$   $x = \dfrac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)} \approx -3.1, 3.6$. Quadratic formula, because the answer must be

$2x^2 - x - 22 = 0$

to the nearest tenth.

REF: 061735ai     NAT: A.REI.D.11     TOP: Quadratic-Linear Systems

723   ANS:
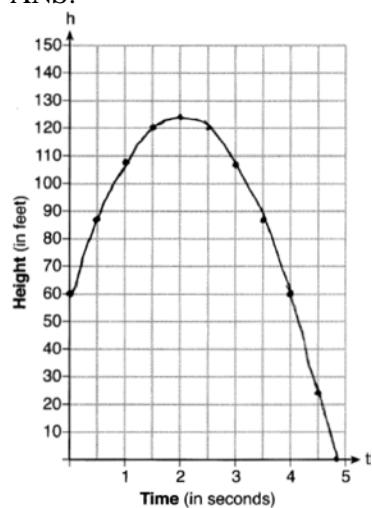


$$\frac{h(2) - h(0)}{2 - 0} = 32$$

REF:   012033ai       NAT:   F.IF.B.4       TOP:   Graphing Quadratic Functions
KEY:   context

724   ANS:



6.4-6.5
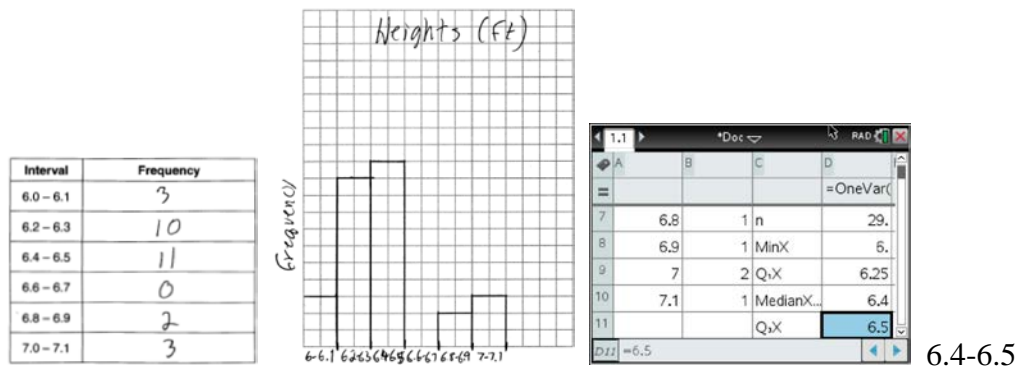
REF:   081734ai       NAT:   S.ID.A.1       TOP:   Frequency Histograms
KEY:   frequency histograms

725   ANS:
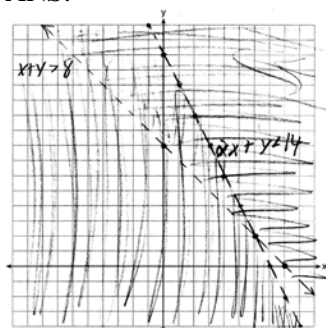


$(6,2)$ is not a solution as its falls on the edge of each inequality.

REF:   061634ai       NAT:   A.REI.D.12    TOP:   Graphing Systems of Linear Inequalities
KEY:   graph

726 ANS:

$x + y \leq 200$          $12x + 8.50(50) \geq 1000$

$12x + 8.50y \geq 1000$          $12x + 425 \geq 1000$

$$12x \geq 575$$

$$x \geq \frac{575}{12}$$

$$48$$

REF: 081635ai     NAT: A.CED.A.3     TOP: Modeling Systems of Linear Inequalities

727 ANS:
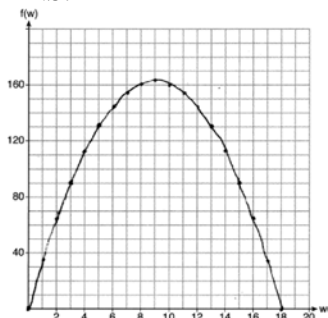
 If the garden's width is 9 ft, its area is 162 ft².

REF: 081836ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
KEY: context

728 ANS:

Two of the following: quadratic formula, complete the square, factor by grouping or graphically.

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8} \approx -0.7, -3.3$$

REF: 011634ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: quadratic formula

729 ANS:

$t = \frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2$ seconds. The height decreases after reaching its maximum at $t = 2$ until it lands at

$t = 5$  $-16t^2 + 64t + 80 = 0$

$$t^2 - 4t - 5 = 0$$

$$(t - 5)(t + 1) = 0$$

$$t = 5$$

REF: 011633ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
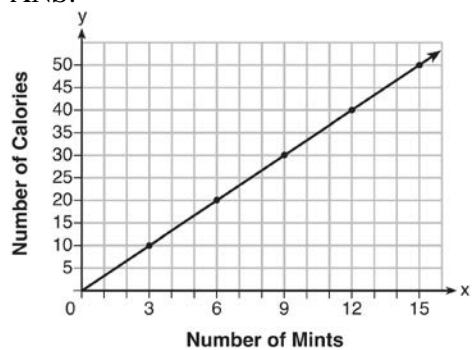KEY: context

730 ANS:
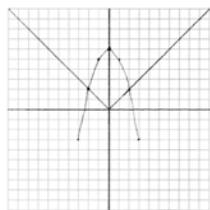


Yes, because the graph of $f(x)$ intersects the graph of $g(x)$ at $x = -2$.

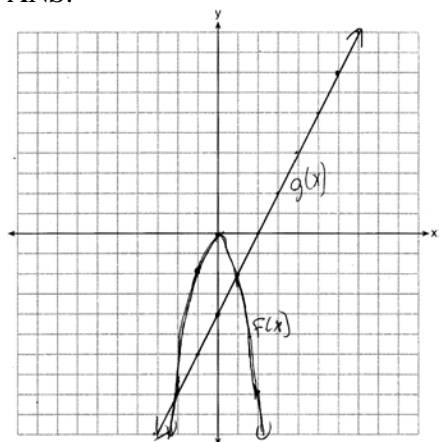REF: 011733ai    NAT: A.REI.D.11    TOP: Other Systems

731 ANS:



$C(x) = \dfrac{10}{3}x$    $180 = \dfrac{10}{3}x$

$540 = 10x$

$54 = x$

REF: fall1308ai    NAT: A.CED.A.2    TOP: Graphing Linear Functions

732 ANS:



$x = -2, 1$

REF: 081435ai    NAT: A.REI.D.11    TOP: Quadratic-Linear Systems

733 ANS:

The vertex represents a maximum since $a < 0$. $f(x) = -x^2 + 8x + 9$

$$= -(x^2 - 8x - 9)$$
$$= -(x^2 - 8x + 16) + 9 + 16$$
$$= -(x-4)^2 + 25$$

REF: 011536ai    NAT: F.IF.C.8    TOP: Vertex Form of a Quadratic

734 ANS:

$f(t) = -58t + 6182$  $r = -.94$  This indicates a strong linear relationship because $r$ is close to -1.

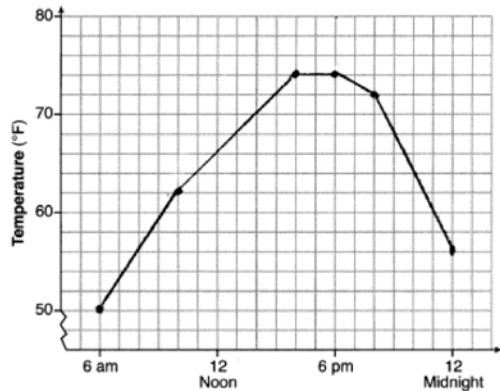REF: 011635ai    NAT: S.ID.B.6    TOP: Regression    KEY: linear with correlation coefficient

735 ANS:
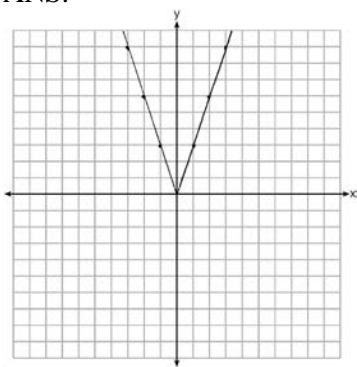


2 down.  4 right.

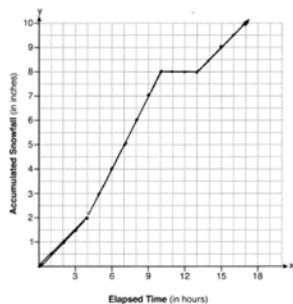REF: 081433ai    NAT: F.BF.B.3    TOP: Graphing Absolute Value Functions

736 ANS:



, 6am-4pm, $\dfrac{74 - 56}{6 - 12} = -3$

REF: 011936ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

737 ANS:



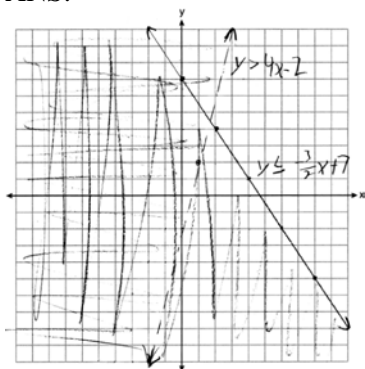$$\frac{10.0-0}{17.0-0} \approx 0.59$$

REF: 081936ai     NAT: F.IF.B.4     TOP: Relating Graphs to Events

738 ANS:

$y = -7.76x + 246.34$, $-0.88$  As the distance from Times Square increases, the cost of a room decreases.

REF: 081935ai     NAT: S.ID.B.6     TOP: Regression     KEY: linear with correlation coefficient

739 ANS:



(1,2) is not in the solution set since it does not fall in an area where the shadings overlap.

REF: 061835ai     NAT: A.REI.D.12   TOP: Graphing Systems of Linear Inequalities
KEY: graph

740 ANS:

The zeros represent when the height of the kite is 0.  The height of the kite is increasing over 0-0.5 and 1-2 minutes.  The maximum height of the kite is 60 feet.

REF: 062233ai     NAT: F.IF.B.4     TOP: Relating Graphs to Events

741 ANS:

$m(x) = (3x-1)(3-x) + 4x^2 + 19$     $x^2 + 10x + 16 = 0$

$m(x) = 9x - 3x^2 - 3 + x + 4x^2 + 19$   $(x+8)(x+2) = 0$

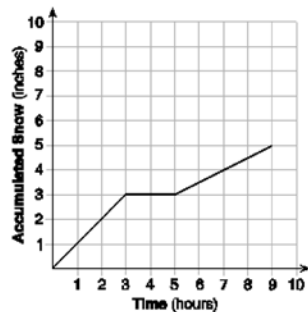$m(x) = x^2 + 10x + 16$     $x = -8, -2$

REF: 061433ai     NAT: A.REI.B.4     TOP: Solving Quadratics
KEY: factoring

742 ANS:

The bus stopped in the interval between *D* and *E*. The bus traveled the fastest in the interval between *C* and *D* at 60 mph. The average rate of speed was $\frac{140}{4} = 35$ mph.

REF: 082233ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events
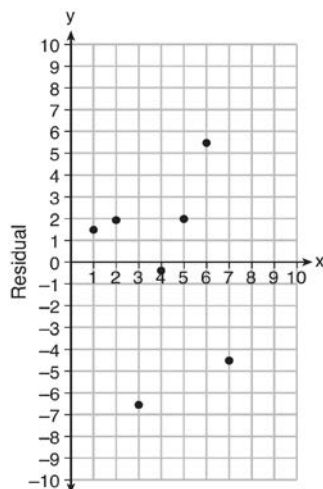
743 ANS:



At 6 hours, $3\frac{1}{2}$ inches of snow have fallen.

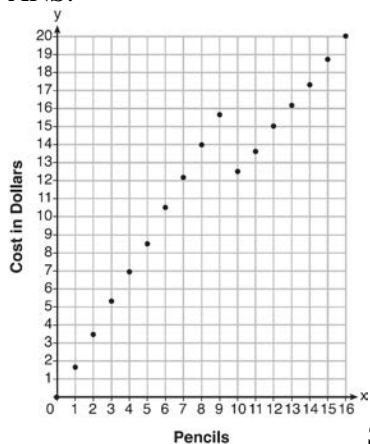REF: spr1307ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

744 ANS:



$y = 6.32x + 22.43$    Based on the residual plot, the equation is a good fit for the data because the residual values are scattered without a pattern and are fairly evenly distributed above and below the *x*-axis.

REF: fall1314ai    NAT: S.ID.B.6    TOP: Residuals

745 ANS:



Since according to the graph, 8 pencils cost $14 and 10 pencils cost $12.50, the cashier is correct.
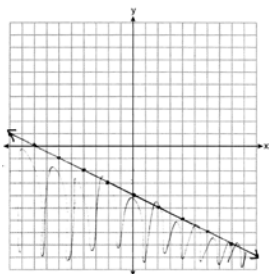
REF: fall1312ai    NAT: F.IF.C.7    TOP: Graphing Piecewise-Defined Functions

746 ANS:

$y = -0.96x + 64.74$, $r = -0.98$. There is a strong correlation between the driver's age and the percentage of accidents caused by speeding.
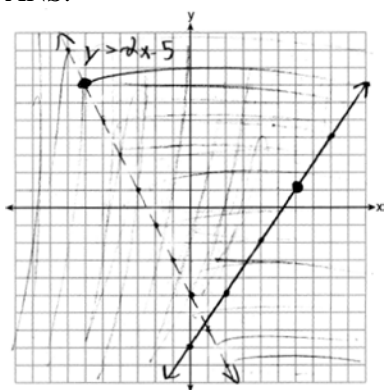
REF: 062235ai    NAT: S.ID.B.6    TOP: Regression    KEY: linear with correlation coefficient

747 ANS:



REF: 081634ai    NAT: A.REI.D.12    TOP: Graphing Linear Inequalities

748 ANS:



$(6,1)$ is on a solid line. $(-6,7)$ is on a dashed line.

REF: 081835ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
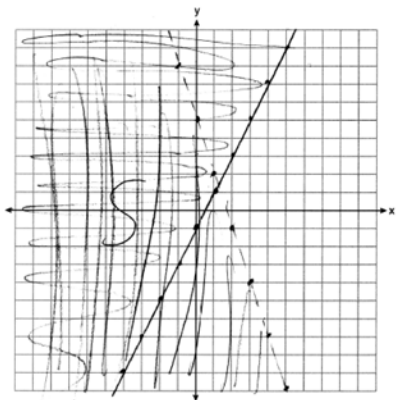KEY: graph

749  ANS:
$135 + 72x \geq 580$  7

$\qquad 72x \geq 445$

$\qquad x \geq 6.2$

REF:  081833ai      NAT:  A.CED.A.1    TOP:  Modeling Linear Inequalities

750  ANS:
$y = 17.159x - 2.476.$  $y = 17.159(.65) - 2.476 \approx 8.7$

REF:  081633ai      NAT:  S.ID.B.6      TOP:  Regression    KEY:  linear

751  ANS:



Yes, as $0 + 3(-5) < 5$

$\qquad 1 \geq 2(-5) - 0$

REF:  082236ai      NAT:  A.REI.D.12    TOP:  Graphing Systems of Linear Inequalities

752  ANS:
$A(x) = 7 + 3(x - 2)$  $7 + 3(x - 2) = 6.50 + 3.25(x - 2)$

$B(x) = 3.25x \qquad 7 + 3x - 6 = 3.25x$

$\qquad\qquad\qquad 1 = 0.25x$

$\qquad\qquad\qquad 4 = x$

REF:  061834ai      NAT:  A.CED.A.3    TOP:  Modeling Linear Systems

753  ANS:
$2L + 1.5W \geq 500$  $2(144) + 1.5W = 500$     142 bottles of water must be sold to cover the cost of renting costumes.

$L + W \leq 360 \qquad\quad 1.5W = 212$

$\qquad\qquad\qquad W = 141.\overline{3}$

REF:  011835ai      NAT:  A.CED.A.3    TOP:  Modeling Systems of Linear Inequalities

754 ANS:

$y < -3x + 3$  Region *A* represents the solution set of the system.  The gray region represents the solution set of

$y \leq 2x - 2$

$y \leq 2x - 2$.

REF:  061936ai    NAT:  A.CED.A.3    TOP:  Modeling Systems of Linear Inequalities

755 ANS:

| $w(52) - w(38)$ | $15(x - 40) + 400 = 445$  Since $w(x) > 400$, $x > 40$.  I substituted 445 for $w(x)$ and solved |
|---|---|
| $15(52 - 40) + 400 - 10(38)$ | $15(x - 40) = 45$ |
| $180 + 400 - 380$ | $x - 40 = 3$ |
| $200$ | $x = 43$ |

for *x*.

REF:  061534ai    NAT:  F.IF.A.2    TOP:  Functional Notation

756 ANS:

$x = \dfrac{-128}{2(-16)} = 4$  $h(4) = -16(4)^2 + 128(4) + 9000 = -256 + 512 + 9000 = 9256$  $(4, 9256)$.  The *y* coordinate represents

the pilot's height above the ground after ejection.  $9256 - 9000 = 256$

REF:  081736ai    NAT:  F.IF.B.4    TOP:  Graphing Quadratic Functions
KEY:  context

757 ANS:

$y = -8.5x + 99.2$  The *y*-intercept represents the length of the rope without knots.  The slope represents the decrease in the length of the rope for each knot.
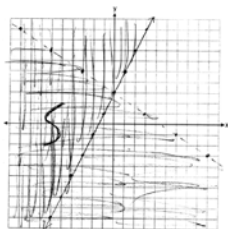
REF:  011834ai    NAT:  S.ID.B.6    TOP:  Regression    KEY:  linear

758 ANS:

$y = 7.79x + 34.27$  $r = 0.98$  high, positive correlation between hours spent studying and test scores

REF:  061935ai    NAT:  S.ID.B.6    TOP:  Regression    KEY:  linear with correlation coefficient

759 ANS:



No, as $2(0) + 3(3) = 9$.

REF:  062236ai    NAT:  A.REI.D.12    TOP:  Graphing Systems of Linear Inequalities

760 ANS:

The set of integers includes negative numbers, so is not an appropriate domain for time; for $(0,6)$, the hourly rate is increasing, or for $(0,14)$, the total numbers of shoes is increasing; $\frac{120-0}{6-14} = -15$, 15 fewer shoes were sold each hour between the sixth and fourteenth hours.
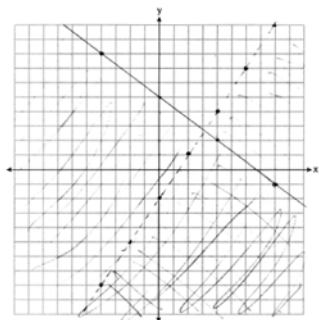
REF: 011836ai    NAT: F.IF.B.6    TOP: Rate of Change

761 ANS:

$V = 450(1.025)^t$; No, $450(1.025)^{20} < 2 \cdot 450$

REF: 011933ai    NAT: A.CED.A.1    TOP: Modeling Exponential Functions

762 ANS:

 No, as $(6,3)$ does not lie in the solution set.

REF: 062135ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
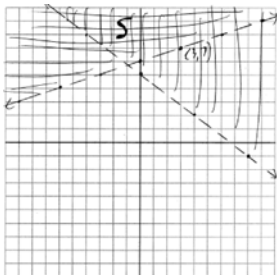KEY: graph

763 ANS:

112; $(3,256)$; At $t = 3$, the ball is 256 ft high; 3-7 seconds

REF: 062136ai    NAT: F.IF.B.4    TOP: Graphing Quadratic Functions
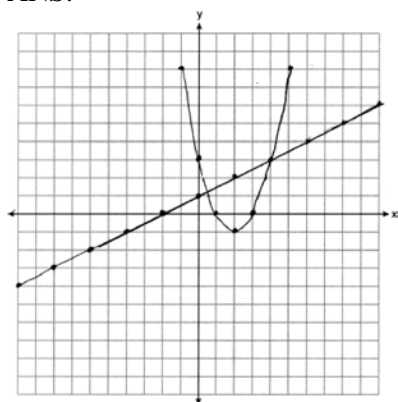KEY: context

764 ANS:

 No, $(3,7)$ is on the boundary line, and not included in the solution set, because this is a strict inequality.

REF: 081735ai    NAT: A.REI.D.12    TOP: Graphing Systems of Linear Inequalities
KEY: graph

765 ANS:



At $x = \dfrac{1}{2}$, $f$ intersects $g$.

REF: 082234ai    NAT: A.REI.D.11    TOP: Quadratic-Linear Systems

766 ANS:

*D-E*, because his speed was slower.  Craig may have stayed at a rest stop during *B-C*.  $\dfrac{230-0}{7-0} \approx 32.9$

REF: 061734ai    NAT: F.IF.B.4    TOP: Relating Graphs to Events

767 ANS:

$y = 0.16x + 8.27$  $r = 0.97$, which suggests a strong association.

REF: 081536ai    NAT: S.ID.B.6    TOP: Regression    KEY: linear with correlation coefficient

768 ANS:

$y = 0.96x + 23.95$, 0.92, high, positive correlation between scores 85 or better on the math and English exams.

REF: 061836ai    NAT: S.ID.B.6    TOP: Regression    KEY: linear with correlation coefficient

769 ANS:

$A(n) = 175 - 2.75n$  $0 = 175 - 2.75n$  After 63 weeks, Caitlin will not have enough money to rent another movie.

$$2.75n = 175$$

$$n = 63.6$$

REF: 061435ai    NAT: F.BF.A.1    TOP: Modeling Linear Functions

770 ANS:

$H(1) - H(2) = -16(1)^2 + 144 - (-16(2)^2 + 144) = 128 - 80 = 48$

$-16t^2 = -144$

$t^2 = 9$

$t = 3$

REF: 061633ai    NAT: A.REI.B.4    TOP: Solving Quadratics
KEY: taking square roots

771 ANS:

$y = 1.9x + 29.8$  $r = 0.3$  This indicates a weak relationship between a dog's height and mass.

REF: 011934ai     NAT: S.ID.B.6     TOP: Regression     KEY: linear with correlation coefficient

772 ANS:

$f(x) = 10 + 100x$, $g(x) = 10(2)^x$; both, since $f(7) = 10 + 100(7) = 710$ and $g(7) = 10(2)^7 = 1280$

REF: 061736ai     NAT: F.LE.A.3     TOP: Families of Functions

773 ANS:

$1.99x + 2.50(x + 2) + 2(2.99) \le 25$     3 pounds of grapes

$1.99x + 2.50x + 5 + 5.98 \le 25$

$4.49x \le 14.02$

$x \le \dfrac{1402}{449}$

REF: 082235ai     NAT: A.CED.A.1     TOP: Modeling Linear Inequalities

774 ANS:

$y = 1.72x + 69.4$, 0.97, high, positive correlation between the number of jumping jacks and heart rate

REF: 062133ai     NAT: S.ID.B.6     TOP: Regression     KEY: linear with correlation coefficient

775 ANS:

$24x + 27y = 144$     $-8.5y = -51$  Agree, as both systems have the same solution.

$24x + 10y = 42$          $y = 6$

$17y = 102$  $8x + 9(6) = 48$

$y = 6$          $8x = -6$
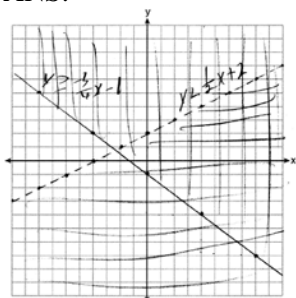
$8x + 9(6) = 48$

$8x = -6$          $x = -\dfrac{3}{4}$

$x = -\dfrac{3}{4}$

REF: 061533ai     NAT: A.REI.C.6     TOP: Solving Linear Systems
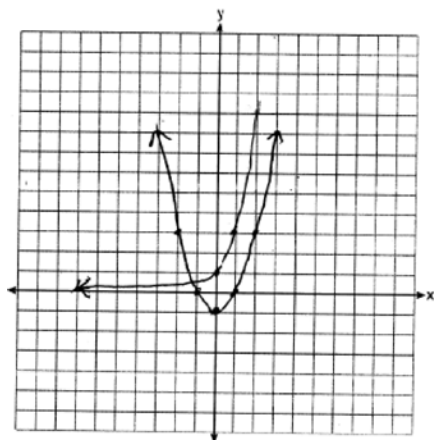
776  ANS:



Correct, as $0 + 2(0) - 4 < 0$

$$3(0) + 4(0) + 4 \geq 0$$

REF:  012034ai     NAT:  A.REI.D.12     TOP:  Graphing Systems of Linear Inequalities
KEY:  graph

777  ANS:



$f(x) = g(x)$ for one value of $x$ because the graphs intersect once.

REF:  062234ai     NAT:  A.REI.D.11     TOP:  Other Systems

## Algebra 1 6 Point Regents Exam Questions
## Answer Section

1   ANS:

$(x-3)(2x) = 1.25x^2$   Because the original garden is a square, $x^2$ represents the original area, $x-3$ represents the side decreased by 3 meters, $2x$ represents the doubled side, and $1.25x^2$ represents the new garden with an area 25% larger.   $(x-3)(2x) = 1.25x^2$   $1.25(8)^2 = 80$

$$2x^2 - 6x = 1.25x^2$$
$$.75x^2 - 6x = 0$$
$$x^2 - 8x = 0$$
$$x(x-8) = 0$$
$$x = 8$$

REF:   011537ai        NAT:  A.CED.A.1     TOP:   Geometric Applications of Quadratics

2   ANS:

$(2x+8)(2x+6) = 100$   The frame has two parts added to each side, so $2x$ must be added to the length and width.

$$4x^2 + 28x + 48 = 100$$
$$x^2 + 7x - 13 = 0$$

Multiply length and width to find area and set equal to 100.   $x = \dfrac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2(1)} = \dfrac{-7 + \sqrt{101}}{2} \approx 1.5$

REF:   081537ai        NAT:  A.CED.A.1     TOP:   Geometric Applications of Quadratics

3   ANS:

$4l + 8m = 40$   No, since $5(5.5) + 2(2.25) \neq 28$     $4l + 8m = 40$     $4(4.5) + 8m = 40$

$5l + 2m = 28$                              $\underline{20l + 8m = 112}$                    $8m = 22$
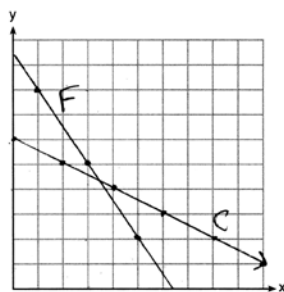
$16l = 72$                    $m = 2.75$

$l = 4.5$

REF:   062137ai        NAT:  A.CED.A.3     TOP:   Modeling Linear Systems

4 ANS:



$3x + 2y = 19$      $6x + 4y = 38$     $2(3.50) + 4y = 24$

$2x + 4y = 24$                $2x + 4y = 24$         $7 + 4y = 24$

                                       $4x = 14$           $4y = 17$

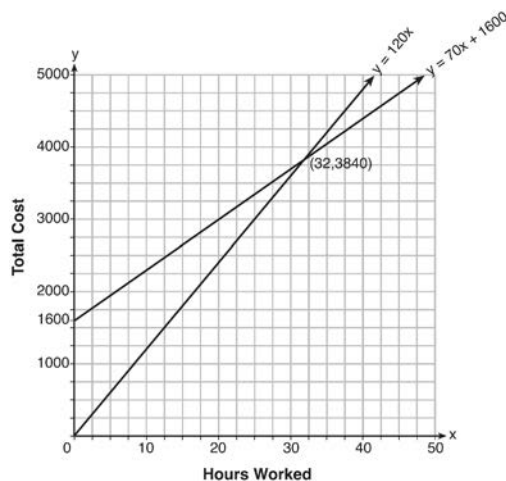                                       $x = 3.50$       $y = 4.25$

REF: 061637ai      NAT: A.REI.C.6      TOP: Graphing Linear Systems

5 ANS:

$b = 4s + 6$       $4s + 6 - 3 = 7s - 21$   $b = 4(8) + 6 = 38$   $38 + x = 3(8 + x)$

$b - 3 = 7(s - 3)$          $3s = 24$                          $x + 38 = 24 + 3x$

                             $s = 8$                               $2x = 14$

                                                         $x = 7$

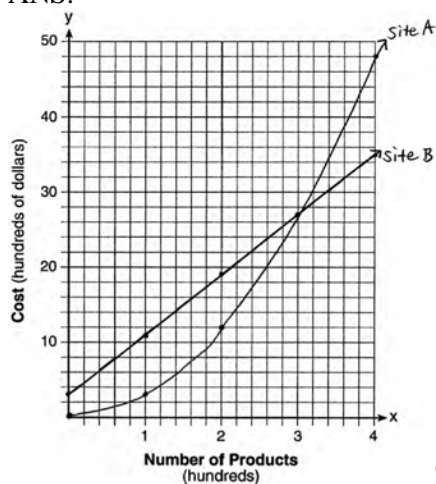REF: 081837ai      NAT: A.CED.A.3      TOP: Modeling Linear Systems

6 ANS:



$y = 120x$ and $y = 70x + 1600$                        $120x = 70x + 1600$

                                                                       $50x = 1600$

                                                                            $x = 32$

$y = 120(35) = 4200$       Green Thumb is less expensive.

$y = 70(35) + 1600 = 4050$

REF: fall1315ai      NAT: A.REI.C.6      TOP: Graphing Linear Systems

7 ANS:



The graphs of the production costs intersect at $x = 3$. The company should use Site $A$, because the cost of Site $A$ is lower at $x = 2$.

REF: 061437ai    NAT: A.REI.D.11    TOP: Quadratic-Linear Systems

8 ANS:

$10d + 25q = 1755$, $10(90 - q) + 25q = 1755$, no, because $20.98 \cdot 1.08 > 90 \cdot 0.25$

$\phantom{10}d + q = 90$    $900 - 10q + 25q = 1755$

$\phantom{10d + q = 90 \quad 900 - 10q + 25}15q = 855$

$\phantom{10d + q = 90 \quad 900 - 10q + 25 15}q = 57$

REF: 061837ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

9 ANS:

$18j + 32w = 19.92$  $14(.52) + 26(.33) = 15.86 \neq 15.76$  $7(18j + 32w = 19.92)$  $18j + 32(.24) = 19.92$

$14j + 26w = 15.76$ $\phantom{14(.52) + 26(.33) = 15.86 \neq 15.76 \quad}9(14j + 26w = 15.76)$    $18j + 7.68 = 19.92$

$\phantom{14j + 26w = 15.76 \quad 14(.52) + 26(.33) = 15.86 \neq}126j + 224w = 139.44$    $\phantom{18j + 7.6}18j = 12.24$

$\phantom{14j + 26w = 15.76 \quad 14(.52) + 26(.33) = 15.86 \neq}126j + 234w = 141.84$    $\phantom{18j + 7.68}j = .68$

$\phantom{14j + 26w = 15.76 \quad 14(.52) + 26(.33) = 15.86 \neq 126j + 22}10w = 2.4$

$\phantom{14j + 26w = 15.76 \quad 14(.52) + 26(.33) = 15.86 \neq 126j + 224}w = .24$

REF: 081637ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

10 ANS:

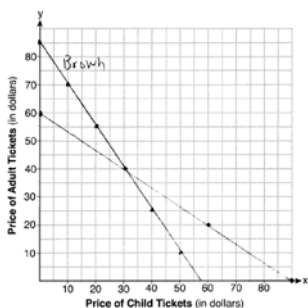$4a + 2c = 325.94$  $4a + 2c = 325.94$  $4a + 2(46.99) = 325.94$  $57.99 + 3(46.99) = 198.96$

$2a + 3c = 256.95$  $\underline{4a + 6c = 513.90}$    $\phantom{4a + 2(46.99) =}4a = 231.96$

$\phantom{2a + 3c = 256.95 \quad 4a + }4c = 187.96$    $\phantom{4a + 2(46.99) =}a = 57.99$

$\phantom{2a + 3c = 256.95 \quad 4a + }c = 46.99$

REF: 062237ai    NAT: A.CED.A.3    TOP: Modeling Linear Systems

11  ANS:



$3x + 2y = 170$          (30,40)  The price of a child's ticket is $30 and the price of an adult's

$4x + 6y = 360$
ticket is $40.

REF:  012037ai      NAT:  A.REI.C.6      TOP:  Graphing Linear Systems

12  ANS:
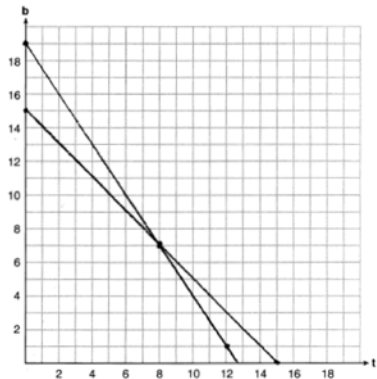


$t + b = 15$  No, because according to the graph, 8 tricycles were ordered.

$3t + 2b = 38$

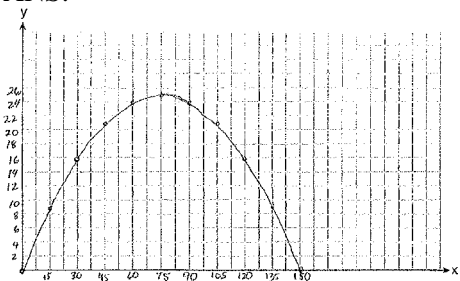REF:  011937ai      NAT:  A.REI.C.6      TOP:  Graphing Linear Systems

13  ANS:

a) $A(x) = 1.50x + 6$  b) $1.50x + 6 = 2x + 2.50$  c) $A(x) = 1.50(5) + 6 = 13.50$  Carnival $B$ has a lower cost.

   $B(x) = 2x + 2.50$          $.50x = 3.50$          $B(x) = 2(5) + 2.50 = 12.50$

                              $x = 7$

REF:  spr1308ai      NAT:  A.REI.C.6      TOP:  Graphing Linear Systems

14 ANS:



$$x = \frac{-\frac{2}{3}}{2\left(-\frac{1}{225}\right)} = -\frac{2}{3} \cdot -\frac{225}{2} = 75 \quad y = -\frac{1}{225}(75)^2 + \frac{2}{3}(75) = -25 + 50 = 25$$

(75,25) represents the horizontal distance (75) where the football is at its greatest height (25). No, because the

ball is less than 10 feet high $y = -\frac{1}{225}(135)^2 + \frac{2}{3}(135) = -81 + 90 = 9$

REF: 061537ai     NAT: F.IF.B.4     TOP: Graphing Quadratic Functions
KEY: context

15 ANS:

$d = 2c - 5; \quad 20 \neq 2(15) - 5$     20 dogs is not five less than twice 15 cats     $\frac{c+3}{2c-5+3} = \frac{3}{4}$     $d = 2(9) - 5 = 13$

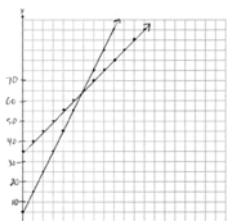$\frac{c+3}{d+3} = \frac{3}{4} \quad 20 \neq 25$

$$4c + 12 = 6c - 6$$
$$18 = 2c$$
$$c = 9$$

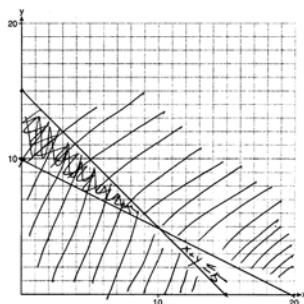REF: 011837ai     NAT: A.CED.A.3     TOP: Modeling Linear Systems

16 ANS:



$y = 10x + 5$     In 2016, the swim team and chorus will each have 65 members.

$y = 5x + 35$

REF: 061737ai     NAT: A.REI.C.6     TOP: Graphing Linear Systems

17 ANS:



$x + y \le 15$  One hour at school and eleven hours at the library.

$4x + 8y \ge 80$

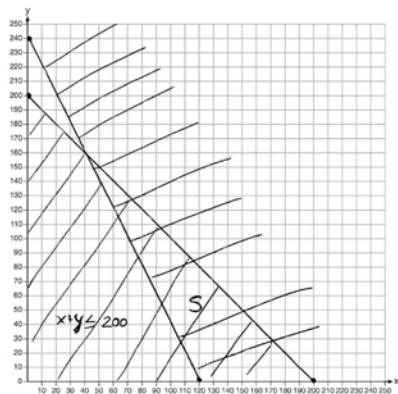REF: 081437ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

18 ANS:

$x + y \le 200$  Marta is incorrect because $12.5(30) + 6.25(80) < 1500$

$12.5x + 6.25y \ge 1500$ $375 + 500 < 1500$

$875 < 1500$



REF: 011637ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

19 ANS:

$1000 - 60x = 600 - 20x.$ $1000 - 60(10) = 400.$ Ian is incorrect because $I = 1000 - 6(16) = 40 \ne 0$

$40x = 400$

$x = 10$

REF: 011737ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

20 ANS:

$30x + 50y = 420$ Peyton is wrong as $2.75(15) + 6.75(35) \ne 270.$ $30x + 50y = 420$ $30x + 50(6) = 420$
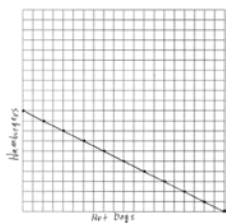
$15x + 35y = 270$ $\underline{30x + 70y = 540}$ $30x = 120$

$20y = 120$ $x = 4$

$y = 6$

REF: 082237ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

21  ANS:

$1.25x + 2.5y = 25$        There are 11 combinations, as each dot represents a possible combination.

$x + 2y = 20$

REF: 081737ai     NAT: A.CED.A.2     TOP: Graphing Linear Functions

22  ANS:

$4c + 3f = 16.53$  No, because $5(2.49) + 4(2.87) \neq 21.11$.  $16c + 12f = 66.12$  $4(2.79) + 3f = 16.53$

$5c + 4f = 21.11$                                               $\underline{15c + 12f = 63.33}$          $3f = 5.37$

                                                                                        $c = 2.79$                $f = 1.79$

REF: 061937ai     NAT: A.CED.A.3     TOP: Modeling Linear Systems

23  ANS:

$3.75A + 2.5D = 35$  $3.75(12 - D) + 2.5D = 35$    $A + 8 = 12$   $\dfrac{7((4)(2) + (8)(1))}{12} = 9\dfrac{1}{3}$  $9 \cdot 2.5 = 22.50$

$A + D = 12$    $45 - 3.75D + 2.5D = 35$          $A = 4$

                            $-1.25D = -10$

                              $D = 8$

REF: 081937ai     NAT: A.CED.A.3     TOP: Modeling Linear Systems