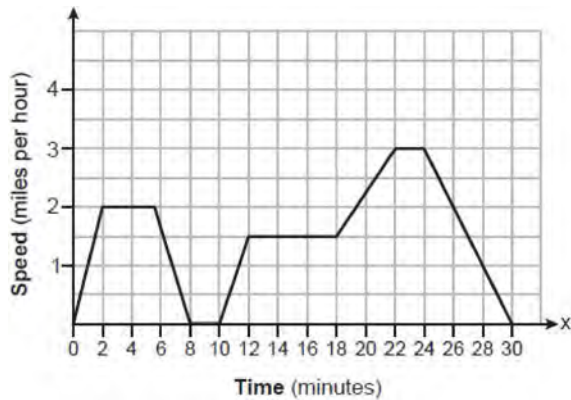


### Algebra I Regents at Random Worksheets

- 1 Given the relation:  $\{(0,4),(2,6),(4,8),(x,7)\}$   
Which value of  $x$  will make this relation a function?

- 1) 0
- 2) 2
- 3) 6
- 4) 4

- 2 The graph below represents a dog walker's speed during his 30-minute walk around the neighborhood.



Which statement best describes what the dog walker was doing during the 12-18 minute interval of his walk?

- 1) He was walking at a constant rate.
  - 2) He was increasing his speed.
  - 3) He was decreasing his speed.
  - 4) He was standing still.
- 3 Ashley only has 7 quarters and some dimes in her purse. She needs at least \$3.00 to pay for lunch. Which inequality could be used to determine the number of dimes,  $d$ , she needs in her purse to be able to pay for lunch?
- 1)  $1.75 + d \geq 3.00$
  - 2)  $1.75 + 0.10d \geq 3.00$
  - 3)  $1.75 + d \leq 3.00$
  - 4)  $1.75 + 0.10d \leq 3.00$

- 4 Morgan read that a snail moves about 72 feet per day. He performs the calculation

$$\frac{72 \text{ feet}}{1 \text{ day}} \cdot \frac{1 \text{ day}}{24 \text{ hours}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

to convert this rate to different units. What are the units for the converted rate?

- 1) hours/inch
  - 2) minutes/inch
  - 3) inches/hour
  - 4) inches/minute
- 5 Which statement is correct about the polynomial  $3x^2 + 5x - 2$ ?
- 1) It is a third-degree polynomial with a constant term of  $-2$ .
  - 2) It is a third-degree polynomial with a leading coefficient of 3.
  - 3) It is a second-degree polynomial with a constant term of 2.
  - 4) It is a second-degree polynomial with a leading coefficient of 3.
- 6 Which linear equation represents a line that passes through the point  $(-3, -8)$ ?
- 1)  $y = 2x - 2$
  - 2)  $y = 2x - 8$
  - 3)  $y = 2x + 13$
  - 4)  $y = 2x - 14$
- 7 In a geometric sequence, the first term is 4 and the common ratio is  $-3$ . The fifth term of this sequence is
- 1) 324
  - 2) 108
  - 3)  $-108$
  - 4)  $-324$

8 Which equation is equivalent to  $x^2 - 6x + 4 = 0$ ?

- 1)  $(x - 3)^2 = -4$
- 2)  $(x - 3)^2 = 5$
- 3)  $(x - 3)^2 = 6$
- 4)  $(x - 3)^2 = 9$

9 The solution to  $2x^2 = 72$  is

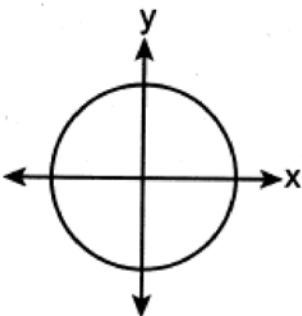
- 1)  $\{9, 4\}$
- 2)  $\{-4, 9\}$
- 3)  $\{6\}$
- 4)  $\{\pm 6\}$

10 Which relation is a function?

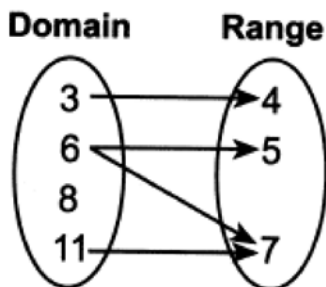
- 1)  $\{(1, 3), (2, 1), (3, 1), (4, 7)\}$

Input	Output
-6	-2
-4	2
7	3
7	5

2)



3)



4)

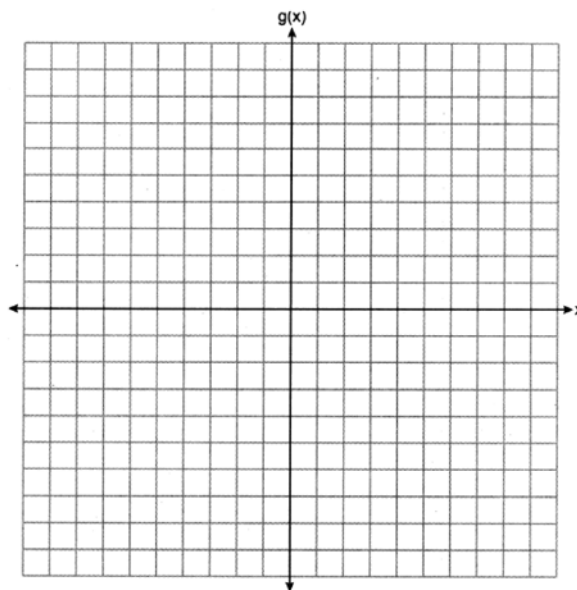
11 Jim uses the equation  $A = P(1 + 0.05)^t$  to find the amount of money in an account,  $A$ , of an investment,  $P$ , after  $t$  years. For this equation, which phrase describes the yearly rate of change?

- 1) decreasing by 5%
- 2) decreasing by 0.05%
- 3) increasing by 5%
- 4) increasing by 0.05%

12 The function  $g$  is defined as

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$

On the set of axes below, graph  $g(x)$ .



13 The function  $f(x) = |x|$  is multiplied by  $k$  to create the new function  $g(x) = k|x|$ . Which statement is true about the graphs of  $f(x)$  and  $g(x)$  if  $k = \frac{1}{2}$ ?

- 1)  $g(x)$  is a reflection of  $f(x)$  over the  $y$ -axis.
- 2)  $g(x)$  is a reflection of  $f(x)$  over the  $x$ -axis.
- 3)  $g(x)$  is wider than  $f(x)$ .
- 4)  $g(x)$  is narrower than  $f(x)$ .

- 14 Suzanna collected information about a group of ponies and horses. She made a table showing the height, measured in hands (hh), and the weight, measured in pounds (lbs), of each pony and horse.

Height (hh)	Weight (lbs)
x	y
11	264
12	638
13	700
14	850
15	1000
16	1230
17	1495

Write the linear regression equation for this set of data. Round all values to the *nearest hundredth*. State the correlation coefficient for the linear regression. Round your answer to the *nearest hundredth*. Explain what the correlation coefficient indicates about the linear fit of the data in the context of the problem.

- 15 Solve  $x^2 - 9x = 36$  algebraically for all values of  $x$ .
- 16 Factor  $18x^2 - 2$  completely.
- 17 Solve the equation algebraically for  $x$ :  
 $-2.4(x + 1.4) = 6.8x - 22.68$
- 18 Caitlin graphs the function  $f(x) = ax^2$ , where  $a$  is a positive integer. If Caitlin multiplies  $a$  by  $-2$ , when compared to  $f(x)$ , the new graph will become
- 1) narrower and open downward
  - 2) narrower and open upward
  - 3) wider and open downward
  - 4) wider and open upward
- 19 Determine the common difference of the arithmetic sequence in which  $a_1 = 3$  and  $a_4 = 15$ .
- 20 Solve  $x^2 + 3x - 9 = 0$  algebraically for all values of  $x$ . Round your answer to the *nearest hundredth*.
- 21 Determine the common difference of the arithmetic sequence in which  $a_1 = 5$  and  $a_5 = 17$ . Determine the 21<sup>st</sup> term of this sequence.
- 22 The expression  $(3x^2 + 4x - 8) + 2(11 - 5x)$  is equivalent to
- 1)  $3x^2 - x + 5$
  - 2)  $3x^2 - x + 14$
  - 3)  $3x^2 - 6x + 14$
  - 4)  $3x^2 + 14x + 14$
- 23 Which function will have the greatest value when  $x > 1$ ?
- 1)  $g(x) = 2(5)^x$
  - 2)  $f(x) = 2x + 5$
  - 3)  $h(x) = 2x^2 + 5$
  - 4)  $k(x) = 2x^3 + 5$

24 Three quadratic functions are given below.

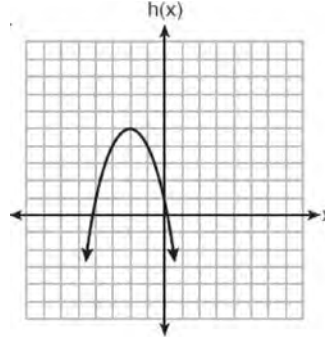
I.

$$f(x) = (x + 2)^2 + 5$$

II.

<b>x</b>	-4	-3	-2	-1	0	1
<b>g(x)</b>	-3	2	5	5	2	-3

III.



Which of these functions have the same vertex?

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

25 The table below shows the number of reported polio cases in Nigeria from 2006 to 2015.

<b>Year</b>	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Number of Cases</b>	1129	285	798	388	21	62	122	53	60	0

What is the average rate of change, to the *nearest hundredth*, of the number of reported polio cases per year in Nigeria from 2006 to 2013?

- 1) -0.01
- 2) -125.44
- 3) -134.50
- 4) -153.71

26 What is the degree of the polynomial  $2x + x^3 + 5x^2$ ?

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

27 Solve  $3d^2 - 8d + 3 = 0$  algebraically for all values of  $d$ , rounding to the *nearest tenth*.

- 28 Julia surveyed 150 of her classmates at City Middle School to determine their favorite animals. Of the 150 students, 46% were male. Forty-two students said their favorite animal was a horse, and of those students were female. Of the 60 students who said dolphins were their favorite animal, 30% were male. Using this information, complete the two-way frequency table below.

	Horse	Dolphin	Penguin	Total
Male				
Female				
Total				

- 29 Students were asked to write  $2x^3 + 3x + 4x^2 + 1$  in standard form. Four student responses are shown below.

Alexa:  $4x^2 + 3x + 2x^3 + 1$

Carol:  $2x^3 + 3x + 4x^2 + 1$

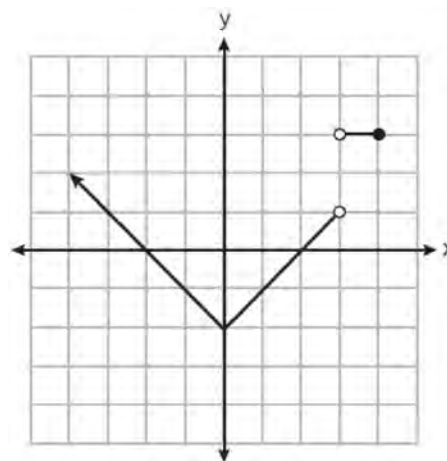
Ryan:  $2x^3 + 4x^2 + 3x + 1$

Eric:  $1 + 2x^3 + 3x + 4x^2$

Which student's response is correct?

- 1) Alexa
  - 2) Carol
  - 3) Ryan
  - 4) Eric
- 30 The expression  $300(4)^{x+3}$  is equivalent to
- 1)  $300(4)^x(4)^3$
  - 2)  $300(4^x)^3$
  - 3)  $300(4)^x + 300(4)^3$
  - 4)  $300^x(4)^3$
- 31 When using the method of completing the square, which equation is equivalent to  $x^2 - 12x - 10 = 0$ ?
- 1)  $(x + 6)^2 = -26$
  - 2)  $(x + 6)^2 = 46$
  - 3)  $(x - 6)^2 = -26$
  - 4)  $(x - 6)^2 = 46$

- 32 Bryan said that the piecewise function graphed below has a domain of all real numbers.

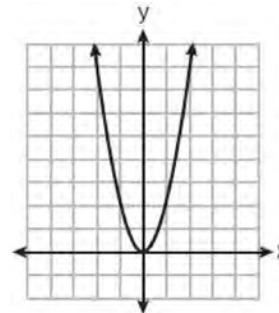


State *two* reasons why Bryan is *incorrect*.

- 33 The length of a rectangular flat-screen television is six inches less than twice its width,  $x$ . If the area of the television screen is 1100 square inches, which equation can be used to determine the width, in inches?
- 1)  $x(2x - 6) = 1100$
  - 2)  $x(6 - 2x) = 1100$
  - 3)  $2x + 2(2x - 6) = 1100$
  - 4)  $2x + 2(6 - 2x) = 1100$

34 A movie theater's popcorn box is a rectangular prism with a base that measures 6 inches by 4 inches and has a height of 8 inches. To create a larger box, both the length and the width will be increased by  $x$  inches. The height will remain the same. Which function represents the volume,  $V(x)$ , of the larger box?

- 1)  $V(x) = (6 + x)(4 + x)(8 + x)$
- 2)  $V(x) = (6 + x)(4 + x)(8)$
- 3)  $V(x) = (6 + x) + (4 + x) + (8 + x)$
- 4)  $V(x) = (6 + x) + (4 + x) + (8)$



35 Which situation represents exponential growth?

- 1) Aidan adds \$10 to a jar each week.
- 2) A pine tree grows 1.5 feet per year.
- 3) Ella earns \$20 per hour babysitting.
- 4) The number of people majoring in computer science doubles every 5 years.

36 If  $f(x) = x^2 + 2x + 1$  and  $g(x) = 7x - 5$ , for which values of  $x$  is  $f(x) = g(x)$ ?

- 1) -1 and 6
- 2) -6 and -1
- 3) -3 and -2
- 4) 2 and 3

37 Given:

$$A = x + 5$$

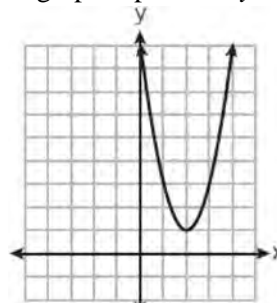
$$B = x^2 - 18$$

Express  $A^2 + B$  in standard form.

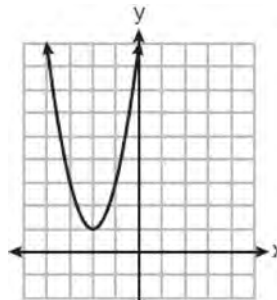
38 Factor completely:  $4x^3 - 49x$

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

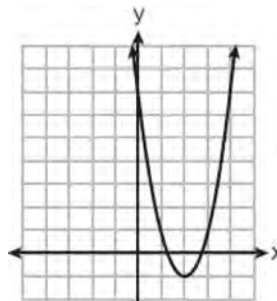
Which graph represents  $y = f(x - 2) + 1$ ?



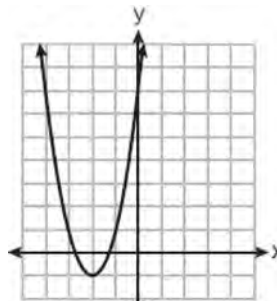
1)



2)



3)



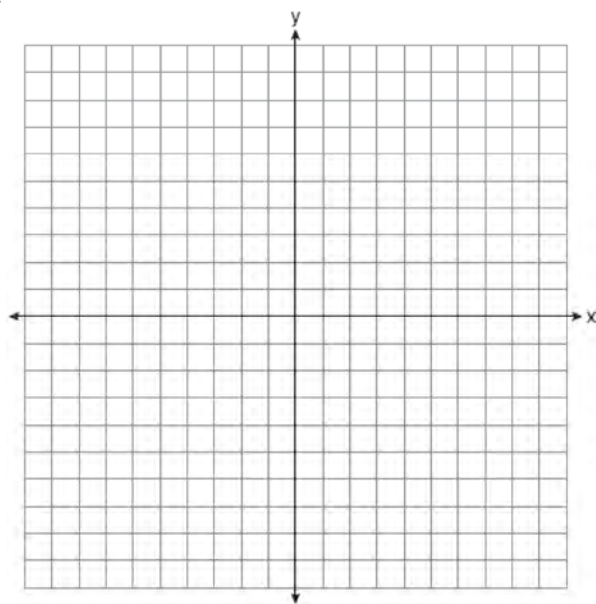
4)

- 40 Solve the following system of inequalities graphically on the set of axes below.

$$2x + 3y \geq -6$$

$$x < 3y + 6$$

Label the solution set  $S$ .

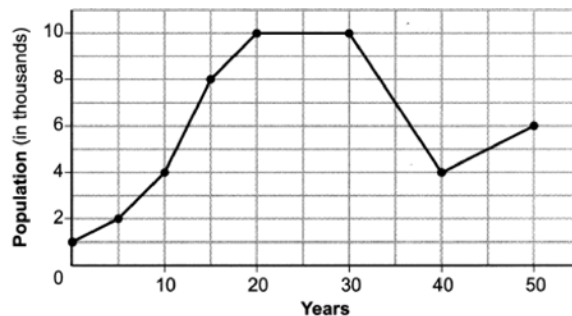


Is the point  $(4, -2)$  in the solution set? Explain your answer.

- 41 The formula for the area of a trapezoid is  $A = \frac{1}{2}(b_1 + b_2)h$ . The height,  $h$ , of the trapezoid may be expressed as
- 1)  $2A - b_1 - b_2$
  - 2)  $\frac{2A - b_1}{b_2}$
  - 3)  $\frac{1}{2}A - b_1 - b_2$
  - 4)  $\frac{2A}{b_1 + b_2}$

- 42 Which expression is equivalent to  $2x^2 + 8x - 10$ ?
- 1)  $2(x - 1)(x + 5)$
  - 2)  $2(x + 1)(x - 5)$
  - 3)  $2(x - 1)(x - 5)$
  - 4)  $2(x + 1)(x + 5)$

- 43 Anessa is studying the changes in population in a town. The graph below shows the population over 50 years.



State the entire interval during which the population remained constant. State the maximum population of the town over the 50-year period. Determine the average rate of change from year 30 to year 40. Explain what your average rate of change means from year 30 to year 40 in the context of the problem.

- 44 The point  $(3, w)$  is on the graph of  $y = 2x + 7$ . What is the value of  $w$ ?
- 1)  $-2$
  - 2)  $-4$
  - 3)  $10$
  - 4)  $13$
- 45 The range of  $f(x) = x^2 + 2x - 5$  is the set of all real numbers
- 1) less than or equal to  $-6$
  - 2) greater than or equal to  $-6$
  - 3) less than or equal to  $-1$
  - 4) greater than or equal to  $-1$

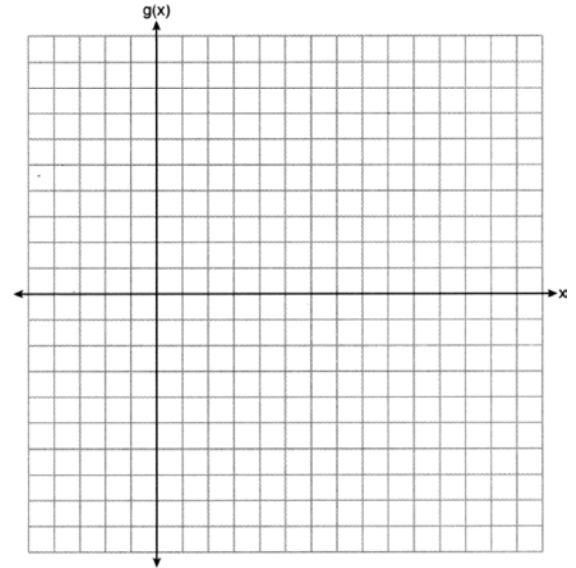
- 46 A software company kept a record of their annual budget for advertising and their profit for each of the last eight years. These data are shown in the table below.

<b>Annual Advertising Budget</b> (in thousands, \$) ( $x$ )	<b>Profit</b> (in millions, \$) ( $y$ )
10	2.2
13	2.4
14	3.2
16	4.6
19	5.7
24	6.9
24	7.9
28	9.3

Write the linear regression equation for this set of data. State, to the *nearest hundredth*, the correlation coefficient of these linear data. State what this correlation coefficient indicates about the linear fit of the data.

- 47 One Saturday afternoon, three friends decided to keep track of the number of text messages they received each hour from 8 a.m. to noon. The results are shown below.  
 Emily said that the number of messages she received increased by 8 each hour.  
 Jessica said that the number of messages she received doubled every hour.  
 Chris said that he received 3 messages the first hour, 10 the second hour, none the third hour, and 15 the last hour.  
 Which of the friends' responses best classifies the number of messages they received each hour as a linear function?  
 1) Emily, only  
 2) Jessica, only  
 3) Emily and Chris  
 4) Jessica and Chris

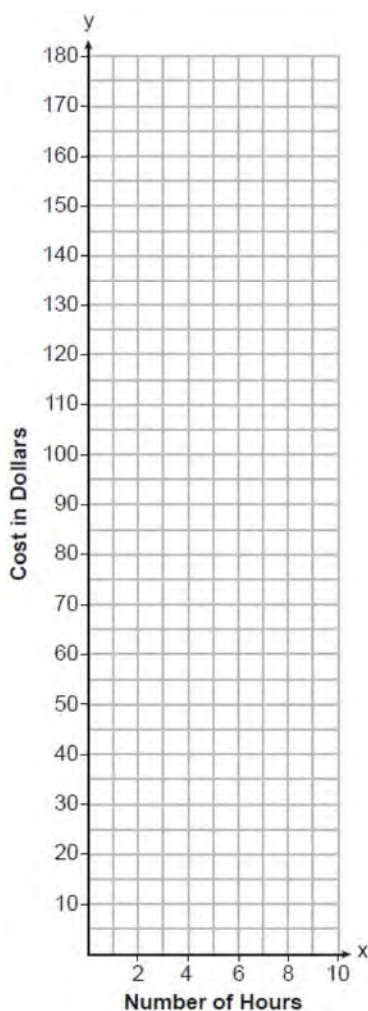
- 49 Graph the function  $g(x) = \sqrt{x+3}$  on the set of axes below.



- 48 Classify the expression  $\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3}$  as rational or irrational. Explain your reasoning.



- 50 Lydia wants to take art classes. She compares the cost at two art centers. Center A charges \$25 per hour and a registration fee of \$25. Center B charges \$15 per hour and a registration fee of \$75. Lydia plans to take  $x$  hours of classes. Write an equation that models this situation, where  $A$  represents the total cost of Center A. Write an equation that models this situation, where  $B$  represents the total cost of Center B. If Lydia wants to take 10 hours of classes, use your equations to determine which center will cost *less*. Graph your equations for Center A and Center B on the set of axes below.



State the number of hours of classes when the centers will cost the same.

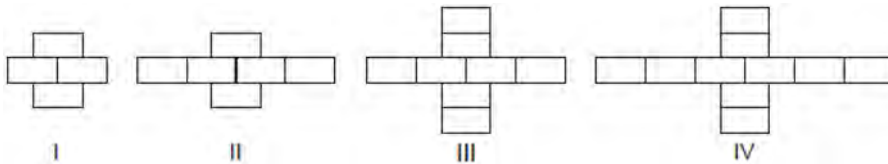
- 51 The senior class at Hills High School is purchasing sports drinks and bottled water to sell at the school field day. At the local discount store, a case of sports drinks costs \$15.79, and a case of bottled water costs \$5.69. The senior class has \$125 to spend on the drinks. If  $x$  represents the number of cases of sports drinks and  $y$  represents the number of cases of bottled water purchased, write an inequality that models this situation. Nine cases of bottled water are purchased for this year's field day. Use your inequality to determine algebraically the maximum number of full cases of sports drinks that can be purchased. Explain your answer.
- 52 Joe compared gas prices in England and New York State one day. In England, gas sold for 1.35 euros per liter, and one dollar equaled 0.622 euros. A correct way to figure out this cost, in dollars per gallon, is
- 1)  $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{1 \text{ L}}{0.264 \text{ gal}} \cdot \frac{\$1.00}{0.622 \text{ euros}}$
  - 2)  $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{\$1.00}{0.622 \text{ euros}} \cdot \frac{0.264 \text{ gal}}{1 \text{ L}}$
  - 3)  $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{1 \text{ L}}{0.264 \text{ gal}} \cdot \frac{0.622 \text{ euros}}{\$1.00}$
  - 4)  $\frac{1.35 \text{ euros}}{1 \text{ L}} \cdot \frac{0.622 \text{ euros}}{\$1.00} \cdot \frac{0.264 \text{ gal}}{1 \text{ L}}$
- 53 Which expression is equivalent to  $(x + 4)^2(x + 4)^3$ ?
- 1)  $(x + 4)^6$
  - 2)  $(x + 4)^5$
  - 3)  $(x^2 + 16)^6$
  - 4)  $(x^2 + 16)^5$

- 54 Some adults were surveyed to find out if they would prefer to buy a sports utility vehicle (SUV) or a sports car. The results of the survey are summarized in the table below.

	SUV	Sports Car	Totals
Male	21	38	59
Female	135	46	181
Totals	156	84	240

Of the number of adults that preferred sports cars, approximately what percent were males?

- 1) 15.8  
2) 45.2  
3) 64.4  
4) 82.6
- 55 Breanna creates the pattern of blocks below in her art class.



A friend tells her that the number of blocks in the pattern is increasing exponentially. Is her friend correct? Explain your reasoning.

- 56 Thirty-two teams are participating in a basketball tournament. Only the winning teams in each round advance to the next round, as shown in the table below.

Number of Rounds Completed, $x$	0	1	2	3	4	5
Number of Teams Remaining, $f(x)$	32	16	8	4	2	1

Which function type best models the relationship between the number of rounds completed and the number of teams remaining?

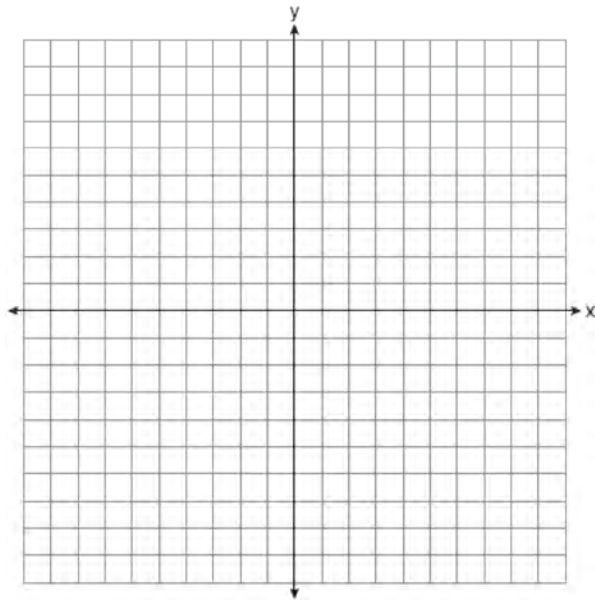
- 1) absolute value  
2) exponential  
3) linear  
4) quadratic
- 57 The domain of the function  $f(x) = x^2 + x - 12$  is
- 1)  $(-\infty, -4]$   
2)  $(-\infty, \infty)$   
3)  $[-4, 3]$   
4)  $[3, \infty)$
- 58 The expression  $(-x^2 + 3x - 7) - (4x^2 + 5x - 2)$  is equivalent to
- 1)  $-5x^2 - 2x - 9$   
2)  $-5x^2 - 2x - 5$   
3)  $-5x^2 + 8x - 9$   
4)  $-5x^2 + 8x - 5$

- 59 Graph the following system of inequalities on the set of axes below:

$$-2y < 3x + 12$$

$$x \geq -3$$

Label the solution set  $S$ .



Allison thinks that  $(2, -9)$  is a solution to this system. Determine if Allison is correct. Justify your answer.

- 60 The Speedy Jet Ski Rental Company charges an insurance fee and an hourly rental rate. The total cost is modeled by the function  $R(x) = 30 + 40x$ . Based on this model, which statements are true?
- I.  $R(x)$  represents the total cost.
  - II.  $x$  is the number of hours rented.
  - III. \$40 is the insurance fee.
  - IV. \$30 is the hourly rental rate.
- 1) I, only
  - 2) I and II, only
  - 3) I, III, and IV, only
  - 4) I, II, III, and IV

- 61 What is the solution to  $2 + 3(2a + 1) = 3(a + 2)$ ?

1)  $\frac{1}{7}$

2)  $\frac{1}{3}$

3)  $-\frac{3}{7}$

4)  $-\frac{1}{3}$

- 62 The function  $G(m)$  represents the amount of gasoline consumed by a car traveling  $m$  miles. An appropriate domain for this function would be

1) integers

2) rational numbers

3) nonnegative integers

4) nonnegative rational numbers

- 63 During summer vacation, Ben decides to sell hot dogs and pretzels on a food cart in Manhattan. It costs Ben \$0.50 for each hot dog and \$0.40 for each pretzel. He has only \$100 to spend each day on hot dogs and pretzels. He wants to sell at least 200 items each day. If  $h$  is the number of hot dogs and  $p$  is the number of pretzels, which inequality would be part of a system of inequalities used to determine the total number of hot dogs and pretzels Ben can sell?

1)  $h + p \leq 200$

2)  $h + p \geq 200$

3)  $0.50h + 0.40p \geq 200$

4)  $0.50h + 0.40p \leq 200$

- 64 When the expression  $2x(x - 4) - 3(x + 5)$  is written in simplest form, the result is

1)  $2x^2 - 11x - 15$

2)  $2x^2 - 11x + 5$

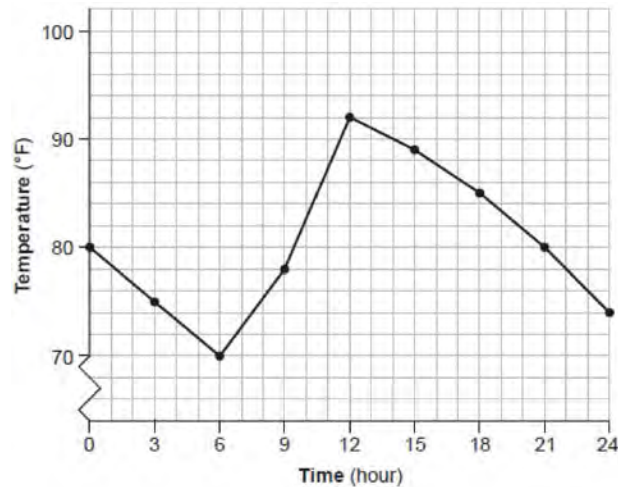
3)  $2x^2 - 3x - 19$

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

- 65 Jean recorded temperatures over a 24-hour period one day in August in Syracuse, NY. Her results are shown in the table below.

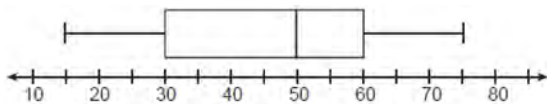
Time (hour)	0	3	6	9	12	15	18	21	24
Temperature (°F)	80	75	70	78	92	89	85	80	74

Her data are modeled on the graph below.



State the entire interval over which the temperature is increasing. State the three-hour interval that has the greatest rate of change in temperature. State the average rate of change from hour 12 to hour 24. Explain what this means in the context of the problem.

- 66 A box plot is shown below.



Which number represents the third quartile?

- 1) 30
- 2) 50
- 3) 60
- 4) 75

- 67 Three expressions are shown below.

- I.  $(x^3)^3$
- II.  $x^4 \cdot x^5$
- III.  $x^{10} \cdot x^{-1}$

Which expressions are equivalent for all positive values of  $x$ ?

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

68 A company ships an average of 30,000 items each week. The approximate number of items shipped each minute is calculated using the conversion

- 1)  $\frac{30,000 \text{ items}}{1 \text{ week}} \cdot \frac{7 \text{ days}}{1 \text{ week}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ day}}{24 \text{ hrs}}$
- 2)  $\frac{30,000 \text{ items}}{1 \text{ week}} \cdot \frac{1 \text{ week}}{7 \text{ days}} \cdot \frac{1 \text{ day}}{24 \text{ hrs}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$
- 3)  $\frac{1 \text{ week}}{30,000 \text{ items}} \cdot \frac{1 \text{ week}}{7 \text{ days}} \cdot \frac{1 \text{ day}}{24 \text{ hrs}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$
- 4)  $\frac{1 \text{ week}}{30,000 \text{ items}} \cdot \frac{7 \text{ days}}{1 \text{ week}} \cdot \frac{24 \text{ hrs}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$

69 What are the zeros of  $m(x) = x(x^2 - 16)$ ?

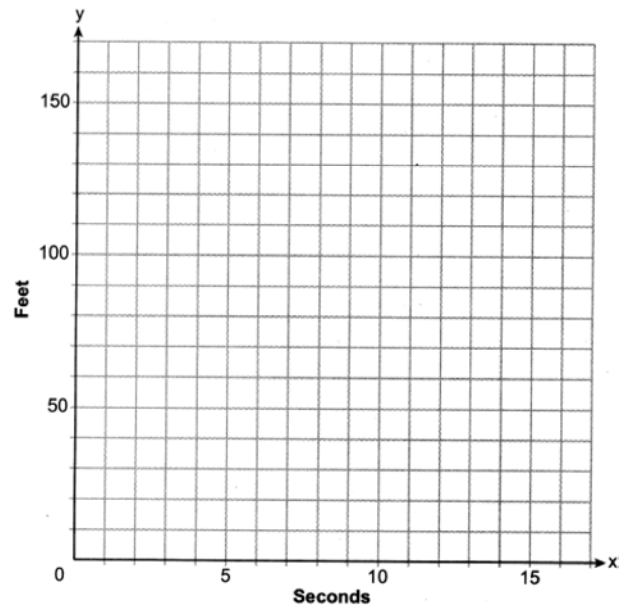
- 1) -4 and 4, only
- 2) -8 and 8, only
- 3) -4, 0, and 4
- 4) -8, 0, and 8

70 Dana went shopping for plants to put in her garden. She bought three roses and two daisies for \$31.88. Later that day, she went back and bought two roses and one daisy for \$18.92. If  $r$  represents the cost of one rose and  $d$  represents the cost of one daisy, write a system of equations that models this situation. Use your system of equations to algebraically determine both the cost of one rose and the cost of one daisy. If Dana had waited until the plants were on sale, she would have paid \$4.50 for each rose and \$6.50 for each daisy. Determine the total amount of money she would have saved by buying all of her flowers during the sale.

71 Mike uses the equation  $b = 1300(2.65)^x$  to determine the growth of bacteria in a laboratory setting. The exponent represents

- 1) the total number of bacteria currently present
- 2) the percent at which the bacteria are growing
- 3) the initial amount of bacteria
- 4) the number of time periods

72 Aidan and his sister Ella are having a race. Aidan runs at a rate of 10 feet per second. Ella runs at a rate of 6 feet per second. Since Ella is younger, Aidan is letting her begin 30 feet ahead of the starting line. Let  $y$  represent the distance from the starting line and  $x$  represent the time elapsed, in seconds. Write an equation to model the distance Aidan traveled. Write an equation to model the distance Ella traveled. On the set of axes below, graph your equations.



Exactly how many seconds does it take Aidan to catch up to Ella? Justify your answer.

73 When completing the square for  $x^2 - 18x + 77 = 0$ , which equation is a correct step in this process?

- 1)  $(x - 9)^2 = 4$
- 2)  $(x - 3)^2 = 2$
- 3)  $x = \pm 13$
- 4)  $x - 9 = \pm 9$

- 74 The sixth-grade classes at West Road Elementary School were asked to vote on the location of their class trip. The results are shown in the table below.

	Playland	Splashdown	Fun Central
Boys	38	53	25
Girls	39	46	37

Determine, to the *nearest percent*, the percentage of girls who voted for Splashdown.

- 75 A fence was installed around the edge of a rectangular garden. The length,  $l$ , of the fence was 5 feet less than 3 times its width,  $w$ . The amount of fencing used was 90 feet. Write a system of equations or write an equation using one variable that models this situation. Determine algebraically the dimensions, in feet, of the garden.
- 76 The formula  $d = t \left( \frac{v_i + v_f}{2} \right)$  is used to calculate the distance,  $d$ , covered by an object in a given period of time,  $t$ . Solve the formula for  $v_f$ , the final velocity, in terms of  $d$ ,  $t$ , and  $v_i$ , the initial velocity.
- 77 A store manager is trying to determine if they should continue to sell a particular brand of nails. To model their profit, they use the function  $p(n)$ , where  $n$  is the number of boxes of these nails sold in a day. A reasonable domain for this function would be
- 1) nonnegative integers
  - 2) rational numbers
  - 3) real numbers
  - 4) integers
- 78 If  $g(x) = -x^2 - x + 5$ , then  $g(-4)$  is equal to
- 1) -15
  - 2) -7
  - 3) 17
  - 4) 25
- 79 What is the equation of the line that passes through the point  $(6, -3)$  and has a slope of  $-\frac{4}{3}$ ?
- 1)  $3y = -4x + 15$
  - 2)  $3y = -4x + 6$
  - 3)  $-3y = 4x + 15$
  - 4)  $-3y = 4x + 6$
- 80 The expression  $(5x^2 - x + 4) - 3(x^2 - x - 2)$  is equivalent to
- 1)  $2x^2 - 2x + 2$
  - 2)  $2x^2 + 2x + 10$
  - 3)  $2x^4 - 2x^2 + 2$
  - 4)  $2x^4 - 2x^2 + 10$
- 81 Which point is a solution to  $y = x^3 - 2x$ ?
- 1)  $(-3, -21)$
  - 2)  $(-2, 10)$
  - 3)  $(1, 1)$
  - 4)  $(4, 2)$

- 82 Ian throws a ball up in the air and lets it fall to the ground. The height of the ball,  $h(t)$ , is modeled by the equation  $h(t) = -16t^2 + 6t + 3$ , with  $h(t)$  measured in feet, and time,  $t$ , measured in seconds. The number 3 in  $h(t)$  represents
- 1) the maximum height of the ball
  - 2) the height from which the ball is thrown
  - 3) the number of seconds it takes for the ball to reach the ground
  - 4) the number of seconds it takes for the ball to reach its maximum height

- 83 Tables of values for four functions are shown below.

x	f(x)
0	6
1	7
2	10
3	15
4	22

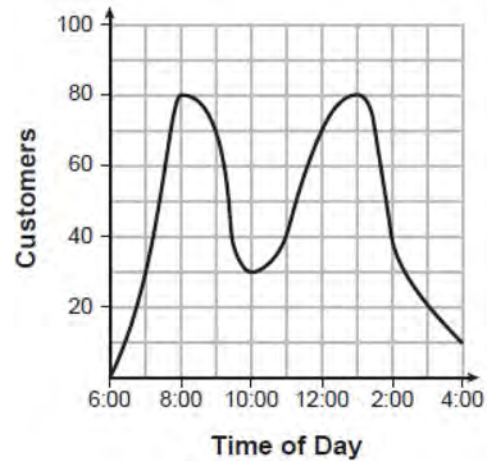
x	h(x)
0	1
1	2
2	4
3	8
4	16

x	g(x)
0	0
1	-2
2	-2
3	0
4	4

x	j(x)
0	2
1	5
2	8
3	11
4	14

- Which table best represents an exponential function?
- 1)  $f(x)$
  - 2)  $g(x)$
  - 3)  $h(x)$
  - 4)  $j(x)$

- 84 A café owner tracks the number of customers during business hours. The graph below models the data.



Based on the graph, the café owner saw a continual

- 1) increase in customers from 6:00 to 11:00
  - 2) increase in customers from 12:00 to 3:00
  - 3) decrease in customers from 1:00 to 4:00
  - 4) decrease in customers from 11:00 to 2:00
- 85 Given  $f(x) = -3x^2 + 10$ , what is the value of  $f(-2)$ ?
- 1) -26
  - 2) -2
  - 3) 22
  - 4) 46
- 86 The 24<sup>th</sup> term of the sequence  $-5, -11, -17, -23, \dots$  is
- 1) -149
  - 2) -143
  - 3) 133
  - 4) 139

- 87 The table below shows the number of math classes missed during a school year for nine students, and their final exam scores.

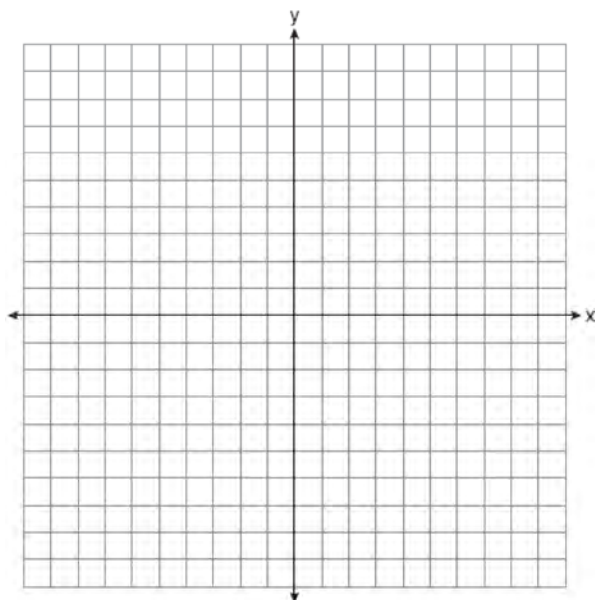
<b>Number of Classes Missed (x)</b>	2	10	3	22	15	2	20	18	9
<b>Final Exam Score (y)</b>	99	72	90	35	60	80	40	43	75

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*. State the correlation coefficient for your linear regression. Round your answer to the *nearest hundredth*. State what the correlation coefficient indicates about the linear fit of the data.

- 88 Given:  $3y - 9 \leq 12$

$$y < -2x - 4$$

Graph the system of inequalities on the set of axes below



State the coordinates of a point that satisfies both inequalities. Justify your answer.

- 89 Use the quadratic formula to solve  $x^2 - 4x + 1 = 0$  for  $x$ . Round the solutions to the *nearest hundredth*.

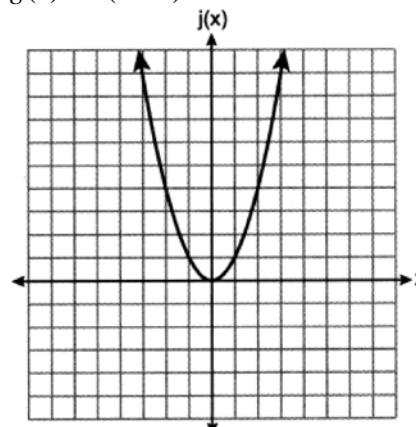
- 90 Which quadratic function has the *smallest* minimum value?

1)  $f(x) = 6x^2 + 5x - 2$

x	h(x)
0	6
1	2
2	0
3	0
4	2
5	6

2)

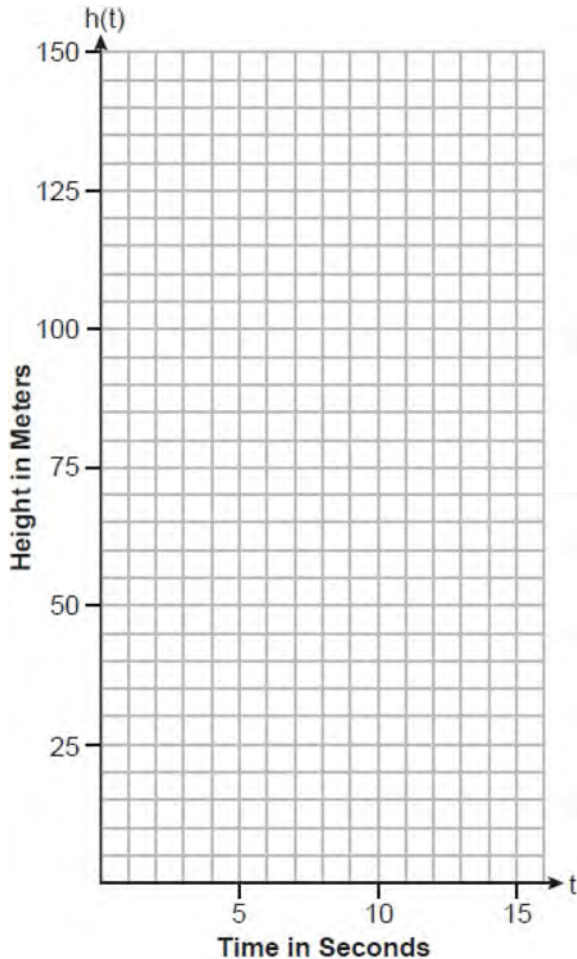
3)  $g(x) = 6(x - 2)^2 - 2$



4)



- 91 The path of a rocket is modeled by the function  $h(t) = -4.9t^2 + 49t$ , where  $h$  is the height, in meters, above the ground and  $t$  is the time, in seconds, after the rocket is launched. Sketch the graph on the set of axes below.

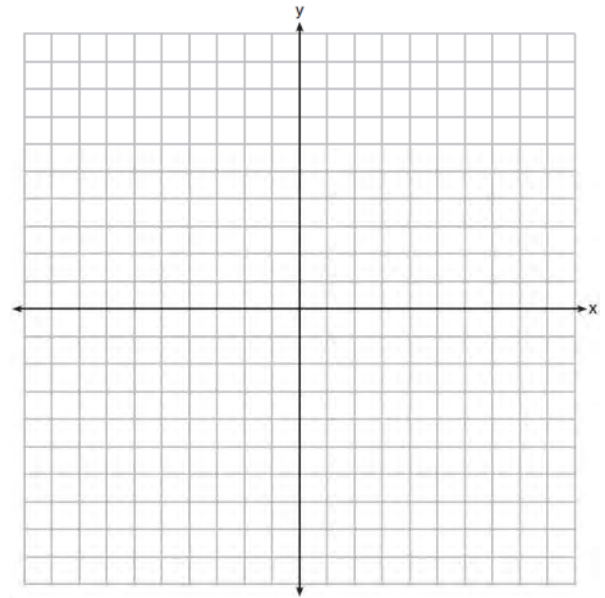


State the vertex of this function. Explain what the vertex means in the context of this situation.

- 92 If  $f(x) = x^2$ , which function is the result of shifting  $f(x)$  3 units left and 2 units down?
- 1)  $g(x) = (x + 2)^2 - 3$
  - 2)  $g(x) = (x - 2)^2 + 3$
  - 3)  $g(x) = (x + 3)^2 - 2$
  - 4)  $g(x) = (x - 3)^2 + 2$

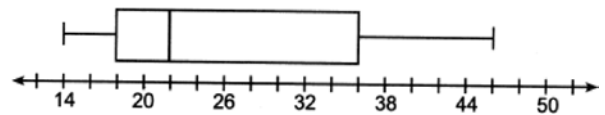
- 93 The expression  $9m^2 - 100$  is equivalent to
- 1)  $(3m - 10)(3m + 10)$
  - 2)  $(3m - 10)(3m - 10)$
  - 3)  $(3m - 50)(3m + 50)$
  - 4)  $(3m - 50)(3m - 50)$

- 94 Graph  $f(x) = |x| + 1$  and  $g(x) = -x^2 + 6x + 1$  on the set of axes below.



Based on your graph, determine all values of  $x$  for which  $f(x) = g(x)$ .

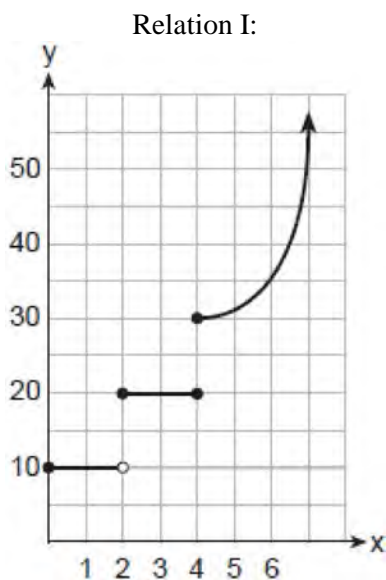
- 95 What is the value of the third quartile in the box plot shown below?



- 1) 18
- 2) 22
- 3) 36
- 4) 46

96 Factor  $2x^2 + 16x - 18$  completely.

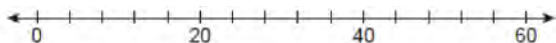
97 The two relations shown below are *not* functions.



Relation II:  
 $\{(-5, -2), (-4, 0), (-2, 1), (-1, 3), (-4, 4)\}$

Explain how you could change each relation so that they each become a function.

98 The data set 20, 36, 52, 56, 24, 16, 40, 4, 28 represents the number of books purchased by nine book club members in a year. Construct a box plot for these data on the number line below.



99 The eleventh term of the sequence  $3, -6, 12, -24, \dots$  is

- 1)  $-3072$
- 2)  $-6144$
- 3)  $3072$
- 4)  $6144$

100 For which function is the value of the y-intercept the *smallest*?

x	f(x)
-4	5
-2	4
0	3
2	2
4	1

- 1)
- 2)  $g(x) = |x| + 4$

x	h(x)
-1	3
0	2
1	3
2	6
3	11

- 3)
- 4)  $k(x) = 5^x$

101 If  $f(x) = x^2 + 3x$ , then which statement is true?

- 1)  $f(1) = f(-1)$
- 2)  $f(2) = f(-2)$
- 3)  $f(1) = f(2)$
- 4)  $f(-1) = f(-2)$

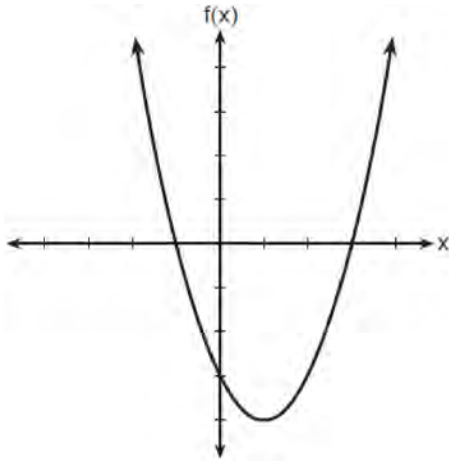
102 What is the solution to  $-3(x - 6) > 2x - 2$ ?

- 1)  $x > 4$
- 2)  $x < 4$
- 3)  $x > -16$
- 4)  $x < -16$

103 Skyler mows lawns in the summer. The function  $f(x)$  is used to model the amount of money earned, where  $x$  is the number of lawns completely mowed. A reasonable domain for this function would be

- 1) real numbers
- 2) rational numbers
- 3) irrational numbers
- 4) natural numbers

104 The function  $f$  is graphed on the set of axes below.



What is a possible factorization of this function?

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

105 If the zeros of the function  $g(x)$  are  $\{-3, 0, 4\}$ , which function could represent  $g(x)$ ?

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

106 Sunny purchases a new car for \$29,873. The car depreciates 20% annually. Which expression can be used to determine the value of the car after  $t$  years?

- 1)  $29,873(.20)^t$
- 2)  $29,873(20)^t$
- 3)  $29,873(1 - .20)^t$
- 4)  $29,873(1 + .20)^t$

107 Solve the inequality  $-\frac{2}{3}x + 6 > -12$  algebraically for  $x$ .

108 What is the solution to the inequality below?

$$4 - \frac{2}{5}x \geq \frac{1}{3}x + 15$$

- 1)  $x \leq 11$
- 2)  $x \geq 11$
- 3)  $x \leq -15$
- 4)  $x \geq -15$

109 What is the value of  $x$  in the equation

$$\frac{5(2x - 4)}{3} + 9 = 14?$$

- 1) 1.9
- 2) 3.5
- 3) 5.3
- 4) 8.9

110 Which expression represents an irrational number?

- 1)  $\sqrt{16} + \sqrt{1}$
- 2)  $\sqrt{25} + \sqrt{4}$
- 3)  $\sqrt{36} + \sqrt{7}$
- 4)  $\sqrt{49} + \sqrt{9}$

111 Given:  $A = \sqrt{363}$  and  $B = \sqrt{27}$

Explain why  $A + B$  is irrational. Explain why  $A \cdot B$  is rational.

112 What is the product of  $(2x + 7)$  and  $(x - 3)$ ?

- 1)  $2x^2 - 21$
- 2)  $2x^2 + x - 21$
- 3)  $2x^2 + 4x - 21$
- 4)  $2x^2 + 13x - 21$

### Algebra I Regents at Random Worksheets

113 If  $x \neq 0$ , then the common ratio of the sequence  $x, 2x^2, 4x^3, 8x^4, 16x^5, \dots$  is

- 1)  $2x$
- 2)  $2$
- 3)  $x$
- 4)  $\frac{1}{2}x$

114 Given  $7x + 2 \geq 58$ , which number is *not* in the solution set?

- 1) 6
- 2) 8
- 3) 10
- 4) 12

115 Factor completely:  $3y^2 - 12y - 288$

116 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)  $y = 64(1 + .3)^{0.5}$

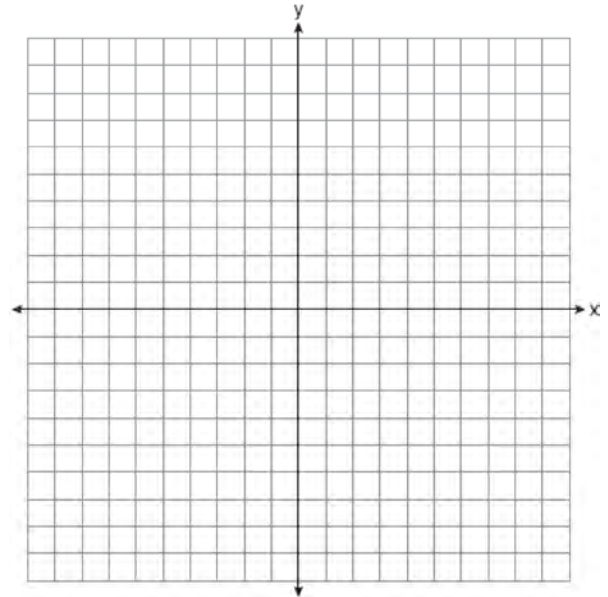
117 Which of the equations below have the same solution?

- 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

118 Solve the system of inequalities graphically on the set of axes below. Label the solution set  $S$ .

$$y + 3x < 5$$

$$1 \geq 2x - y$$



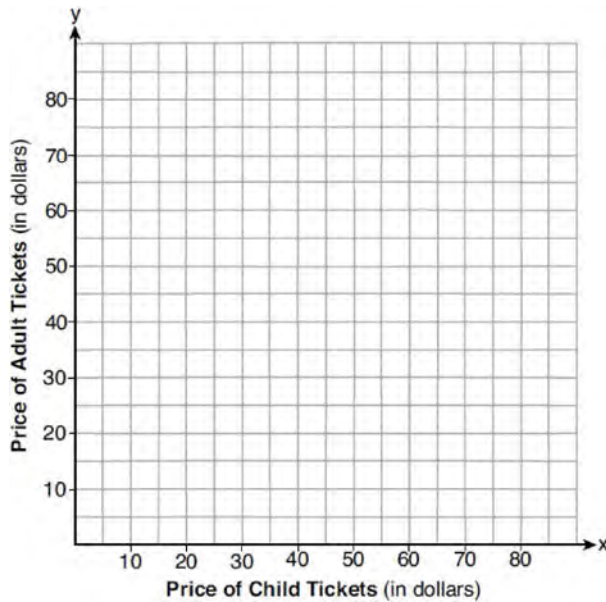
Is the point  $(-5, 0)$  in the solution set? Explain your answer.

119 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)  $C(x) = 35 + (x + 245)$

120 Is the product of  $\sqrt{8}$  and  $\sqrt{98}$  rational or irrational? Justify your answer.

- 121 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.



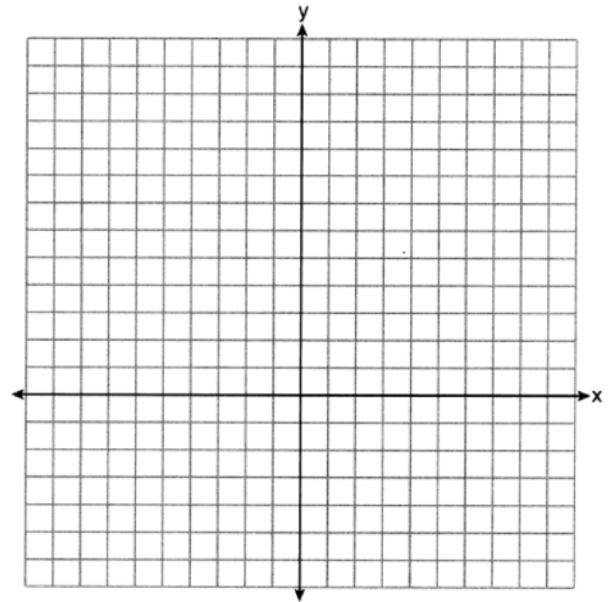
State the coordinates of the point of intersection. Explain what each coordinate of the point of intersection means in the context of the problem.

- 122 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
- 123 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)  $(x + 6)(x - 1)$

- 124 Given: the sequence 4, 7, 10, 13, ...  
 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)  $d$

- 125 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.

- 126 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.

- 127 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
- 128 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)  $2a + 1$
- 129 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
- 130 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.

- 131 Solve  $6x^2 + 5x - 6 = 0$  algebraically for the exact values of  $x$ .

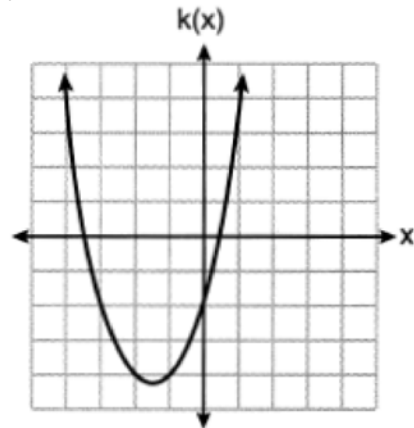
- 132 Which function has the *smallest* y-intercept?

1)  $g(x) = 2x - 6$

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

2)

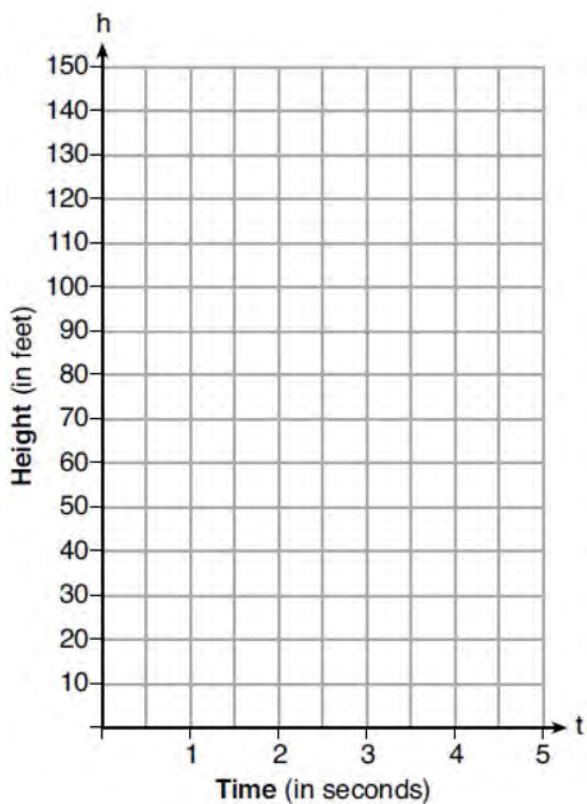
3)  $f(x) = \sqrt{x} - 2$



4)

- 133 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)  $0 \leq t \leq 14$

- 134 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.

- 135 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

- 136 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.

- 137 Which system has the same solution as the system below?

$$x + 3y = 10$$

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

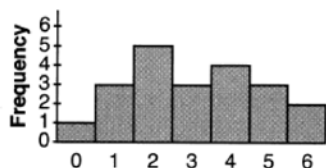
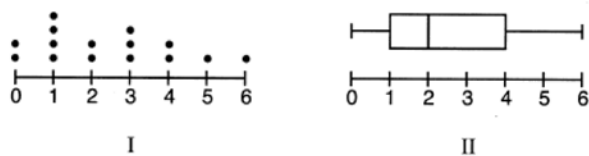
- 1)  $-x + y = 6$   
 $2x + 6y = 20$
- 2)  $-x + y = 14$   
 $2x + 6y = 20$
- 3)  $x + y = 6$   
 $2x + 6y = 20$
- 4)  $x + y = 14$   
 $2x + 6y = 20$



- 138 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)  $(x - 6)(x - 4)$

- 139 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)  $2x^3 + 3x^2 + 3x$

- 140 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
- 141 The expression  $(m - 3)^2$  is equivalent to
- 1)  $m^2 + 9$
  - 2)  $m^2 - 9$
  - 3)  $m^2 - 6m + 9$
  - 4)  $m^2 - 6m - 9$

- 142 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.

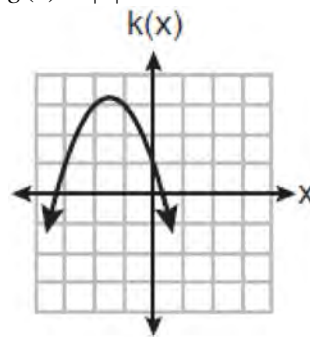
- 143 Which function has the largest y-intercept?

1)  $f(x) = -4x - 1$

$x$	$h(x)$
-1	1.5
0	2
1	3
2	5

2)

3)  $g(x) = |x| + 3$



4)

- 144 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.



145 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.

146 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)  $0.50x + 2y \leq 100$
- 2)  $0.50x + 2y \geq 100$
- 3)  $2x + 0.50y \leq 100$
- 4)  $2x + 0.50y \geq 100$

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

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

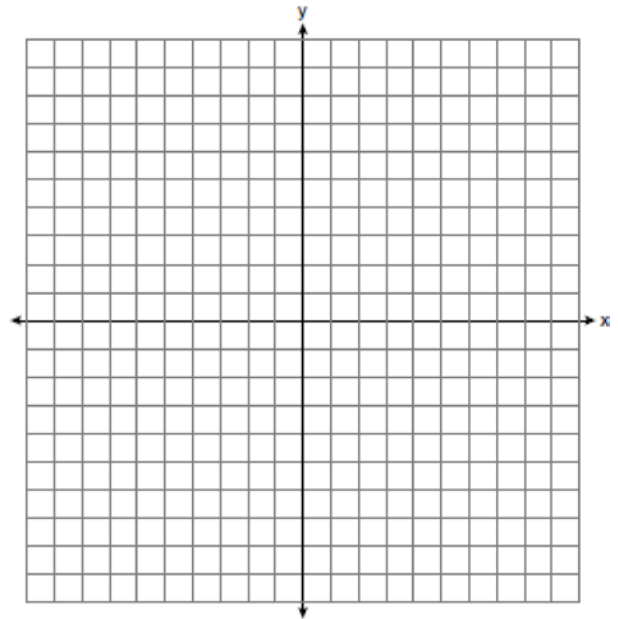
148 At Benny's Cafe, a mixed-greens salad costs \$5.75. Additional toppings can be added for \$0.75 each. Which function could be used to determine the cost,  $c(s)$ , in dollars, of a salad with  $s$  additional toppings?

- 1)  $c(s) = 5.75s + 0.75$
- 2)  $c(s) = 0.75s + 5.75$
- 3)  $c(s) = 5.00s + 0.75$
- 4)  $c(s) = 0.75s + 5.00$

149 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.

150 Use the method of completing the square to determine the exact values of  $x$  for the equation  $x^2 - 8x + 6 = 0$ .

151 Two texting plans are advertised. Plan A has a monthly fee of \$15 with a charge of \$0.08 per text. Plan B has a monthly fee of \$3 with a charge of \$0.12 per text. If  $t$  represents the number of text messages in a month, which inequality should be used to show that the cost of Plan A is *less* than the cost of Plan B?

- 1)  $15 + 0.08t < 3 + 0.12t$
- 2)  $15 + 0.08t > 3 + 0.12t$
- 3)  $15t + 0.08 < 3t + 0.12$
- 4)  $15t + 0.08 > 3t + 0.12$

- 152 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.

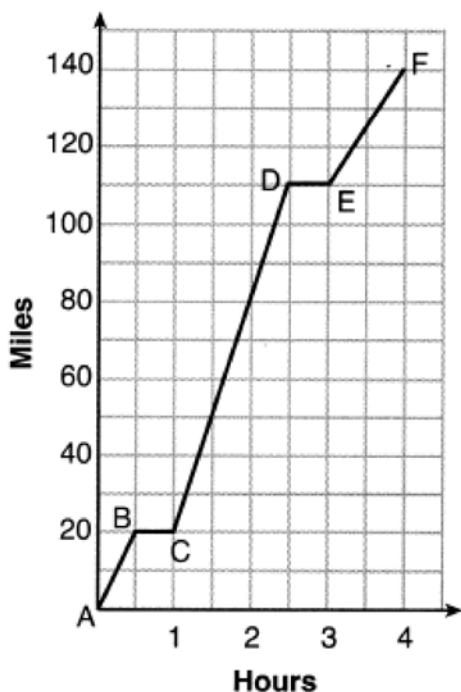
- 153 The following table represents a sample of sale prices, in thousands of dollars, and number of new homes available at that price in 2017.

<b>Sale Price, <math>p</math></b> (in thousands of dollars)	160	180	200	220	240	260	280
<b>Number of New Homes Available</b> $f(p)$	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.

- 154 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?
- $1.50(5) + 2.00m \geq 19.00$
  - $1.50(5) + 2.00m \leq 19.00$
  - $1.50c + 2.00(5) \geq 19.00$
  - $1.50c + 2.00(5) \leq 19.00$
- 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
- $k$  units to the left and a move of 5 units up
  - $k$  units to the left and a move of 5 units down
  - $k$  units to the right and a move of 5 units up
  - $k$  units to the right and a move of 5 units down
- 156 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.
- 157 If  $f(x) = x^2 + 2x + 1$  and  $g(x) = 3x + 5$ , then what is the value of  $f(1) - g(3)$ ?
- 10
  - 8
  - 10
  - 8
- 158 Solve  $3x^2 - 5x - 7 = 0$  algebraically for all values of  $x$ , rounding to the *nearest tenth*.

- 159 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?

- 160 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

- 161 Express  $(3x - 4)(x + 7) - \frac{1}{4}x^2$  as a trinomial in standard form.

- 162 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.

- 163 Describe the transformations performed on the graph of  $f(x) = x^2$  to obtain the graph of  $g(x)$  when  $g(x) = (x - 3)^2 - 4$ .

- 164 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)  $-4x^2 + 3x^4 - 4$

- 165 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

- 166 Use the method of completing the square to determine the vertex of  $f(x) = x^2 - 14x - 15$ . State the coordinates of the vertex.

167 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

$22a + 12 = 34$  \_\_\_\_\_

168 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

169 Determine the exact values of  $x$  for  $x^2 - 8x - 5 = 0$  by completing the square.

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

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

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

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?

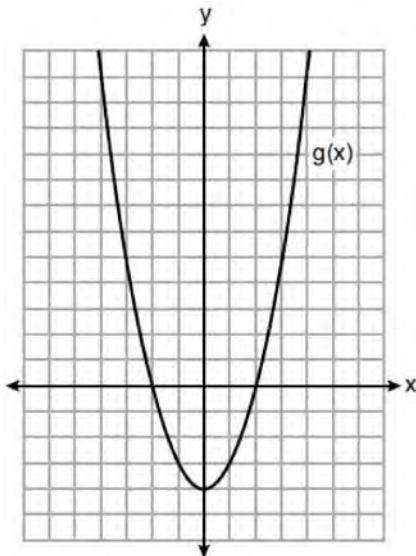
- 1) II, only
- 2) IV, only
- 3) I and IV
- 4) II and III

172 What would be the order of these quadratic functions when they are arranged from the narrowest graph to the widest graph?

$f(x) = -5x^2$   $g(x) = 0.5x^2$   $h(x) = 3x^2$

- 1)  $f(x), g(x), h(x)$
- 2)  $g(x), h(x), f(x)$
- 3)  $h(x), f(x), g(x)$
- 4)  $f(x), h(x), g(x)$

- 173 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  $x = -4$ .
- 174 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.
- 175 Solve  $4w^2 + 12w - 44 = 0$  algebraically for  $w$ , to the nearest hundredth.

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

- 177 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

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

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

- 180 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  $C = \frac{5}{9}(F - 32)$  for  $F$  so that Josh can convert Celsius to Fahrenheit.

181 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.

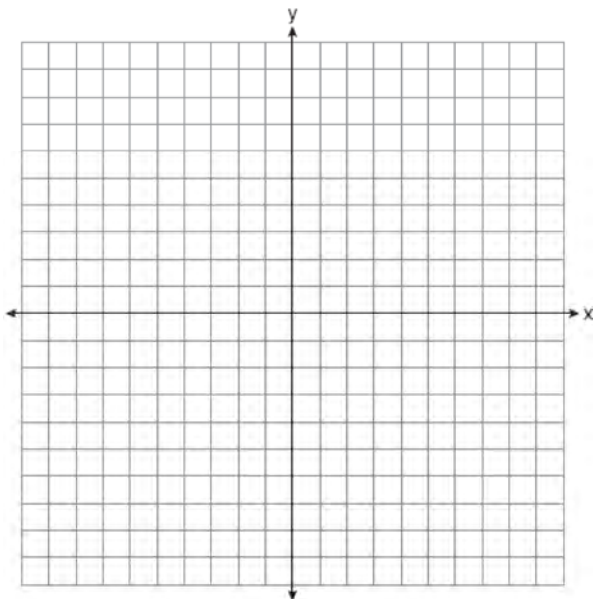
<b>Age (<math>x</math>)</b>	17	18	21	25	30	35	40	45	50	55	60	65
<b>Percentage of Accidents Caused by Speeding (<math>y</math>)</b>	49	49	48	38	31	33	24	25	16	10	5	6

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.

182 Graph the system of inequalities on the set of axes below:

$$y \leq -\frac{3}{4}x + 5$$

$$3x - 2y > 4$$



Is (6,3) a solution to the system of inequalities? Explain your answer.

183 Solve algebraically for  $y$ :  $4(y - 3) \leq 4(2y + 1)$

184 What is the solution to  $\frac{3}{2}b + 5 < 17$ ?

- 1)  $b < 8$
- 2)  $b > 8$
- 3)  $b < 18$
- 4)  $b > 18$

185 What is the degree of the polynomial

$$5x - 3x^2 - 1 + 7x^3?$$

- 1) 1
- 2) 2
- 3) 3
- 4) 5

186 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)

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

- 1)  $[-5, \infty)$
- 2)  $(-5, \infty)$
- 3)  $[3, \infty)$
- 4)  $(3, \infty)$

- 188 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.

<b>Time (min)</b>	2	5	7	10	12
<b>Height (ft)</b>	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.

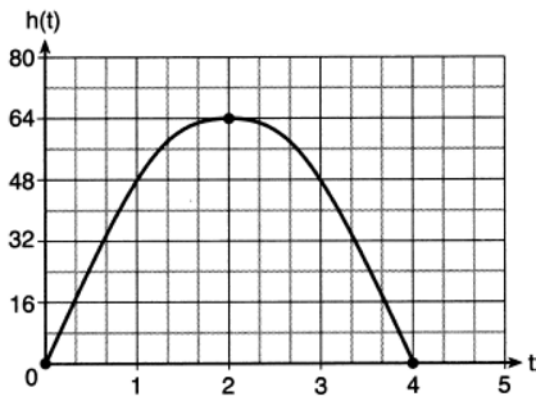
- 189 In an organism, the number of cells,  $C(d)$ , after  $d$  days can be represented by the function  $C(d) = 120 \cdot 2^{3d}$ . This function can also be expressed as
- 1)  $C(d) = 240^{3d}$
  - 2)  $C(d) = 960 \cdot 2^d$
  - 3)  $C(d) = 120 \cdot 6^d$
  - 4)  $C(d) = 120 \cdot 8^d$
- 190 Mrs. 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
- 191 Factor  $x^4 - 16$  completely.
- 192 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
- 193 A formula for determining the finite sum,  $S$ , of an arithmetic sequence of numbers is  $S = \frac{n}{2}(a + b)$ , 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  $n$ .
- 194 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)  $2x + x^2 + 4x^3$
- 195 If  $f(x) = \frac{3x+4}{2}$ , then  $f(8)$  is
- 1) 21
  - 2) 16
  - 3) 14
  - 4) 4

196 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.

197 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)  $[0,64]$

198 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)  $-4(x^3 - 2) + x(x - 6)$

199 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)  $\frac{C - Ax}{B}$
- 2)  $\frac{C - A}{Bx}$
- 3)  $\frac{C - A}{x + B}$
- 4)  $\frac{C - B}{Ax}$

200 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)  $6x - 15 + 2x^2 - 5x$

201 Given  $f(x) = 3x - 5$ , which statement is true?

- 1)  $f(0) = 0$
- 2)  $f(3) = 4$
- 3)  $f(4) = 3$
- 4)  $f(5) = 0$

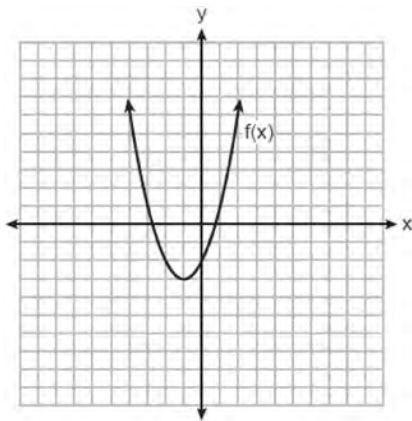


- 202 Joey recorded his heart rate, in beats per minute (bpm), after doing different numbers of jumping jacks. His results are shown in the table below.

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.

- 203 The function  $f(x)$  is graphed on the set of axes below.



What is the equation of the axis of symmetry for  $f(x)$ ?

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

- 204 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)  $(x - 10)^2 = 12$

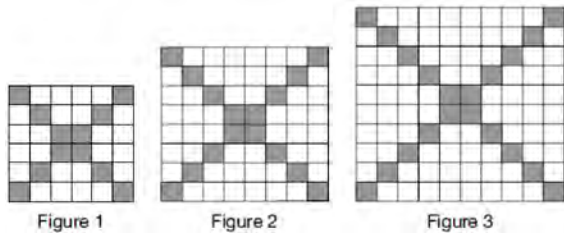
- 205 Given the relation  $R = \{(-4, 2), (3, 6), (x, 8), (-1, 4)\}$  Which value of  $x$  would make this relation a function?

- 1)  $-4$
- 2)  $-1$
- 3)  $3$
- 4)  $0$

- 206 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)  $(d - 5) + 2d = 1.45$

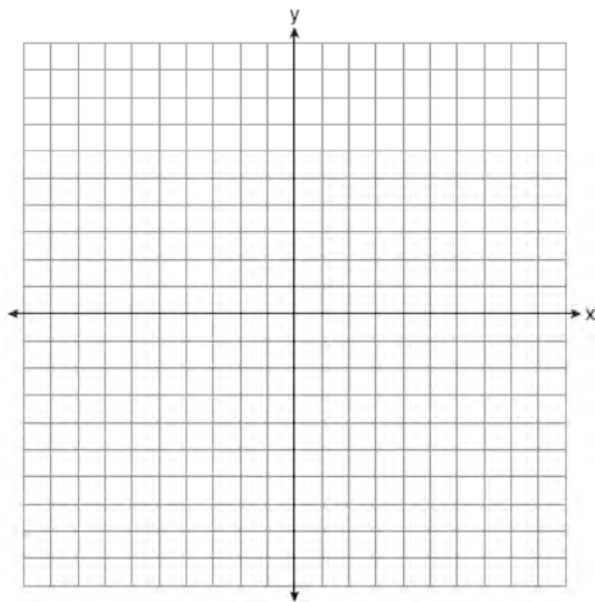
207 The shaded boxes in the figures below represent a sequence.



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

208 Graph the system of inequalities:  
 $-x + 2y - 4 < 0$   
 $3x + 4y + 4 \geq 0$

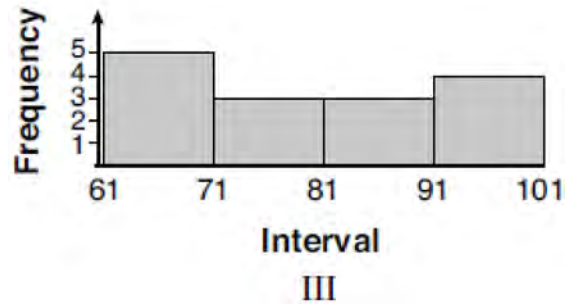
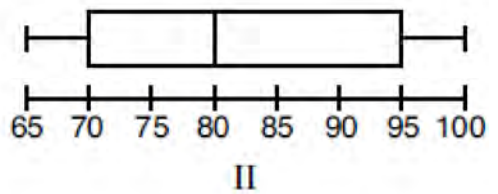
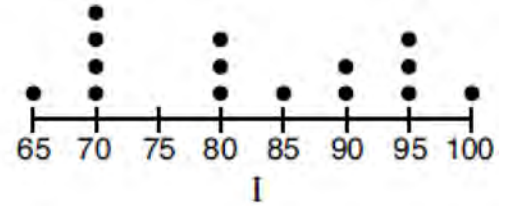


Stephen says the point (0,0) is a solution to this system. Determine if he is correct, and explain your reasoning.

209 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?



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

210 What is the constant term of the polynomial

$$4d + 6 + 3d^2?$$

- 1) 6
- 2) 2
- 3) 3
- 4) 4

- 211 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.

- 212 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)  $3x - y = 7$   
 $x + y = 2$
- 213 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  $g(x)$ .
- 214 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.

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

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

1)  $\frac{4.5 \text{ hr}}{50 \text{ km}} \cdot \frac{1.609 \text{ km}}{1 \text{ mi}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$

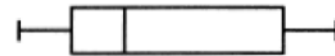
2)  $\frac{50 \text{ km}}{4.50 \text{ hr}} \cdot \frac{1 \text{ mi}}{1.609 \text{ km}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$

3)  $\frac{50 \text{ km}}{4.50 \text{ hr}} \cdot \frac{1 \text{ mi}}{1.609 \text{ km}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$

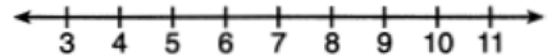
4)  $\frac{4.5 \text{ hr}}{50 \text{ km}} \cdot \frac{1 \text{ mi}}{1.609 \text{ km}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$

- 217 Below are two representations of data.

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



B:

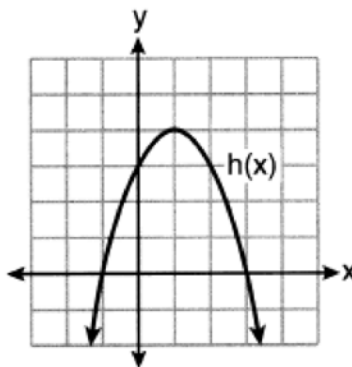


Which statement about  $A$  and  $B$  is true?

- 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  $B$
- 218 Factor the expression  $x^4 - 36x^2$  completely.
- 219 State whether the product of  $\sqrt{3}$  and  $\sqrt{9}$  is rational or irrational. Explain your answer.

220 Four quadratic functions are shown below.

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



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

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

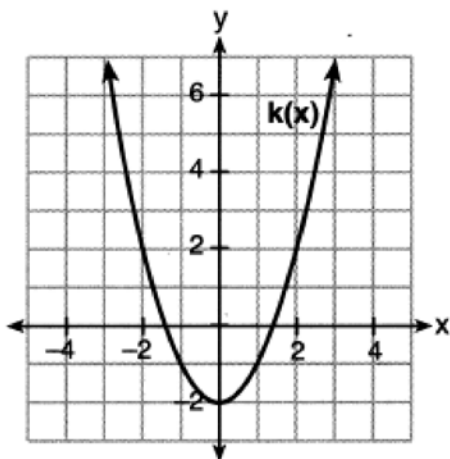
Which statement is true?

- 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  $j(x)$ .

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

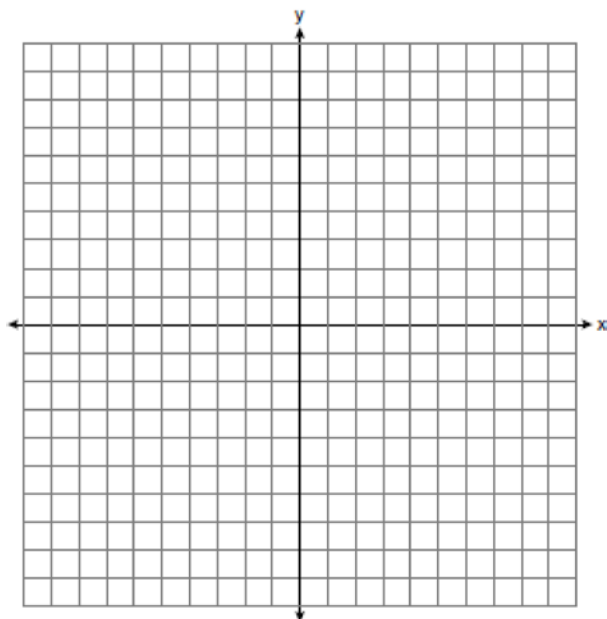
x	g(x)
-2	3
0	1
1	0
3	-2

- 1)
- 2)  $h(x) = \sqrt{x} - 3$



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

222 Graph the function  $f(x) = \left| \frac{1}{2}x + 3 \right|$  over the interval  $-8 \leq x \leq 0$ .



223 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

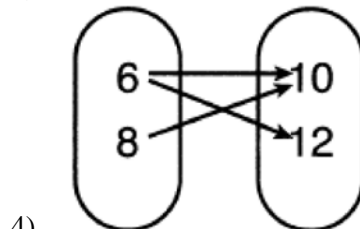
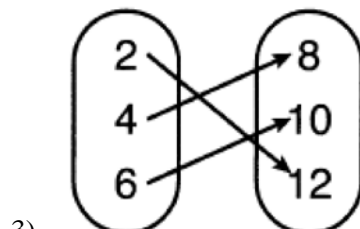
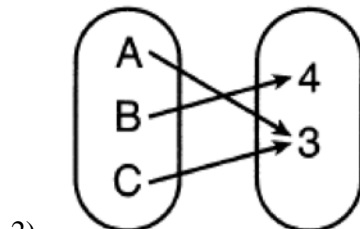
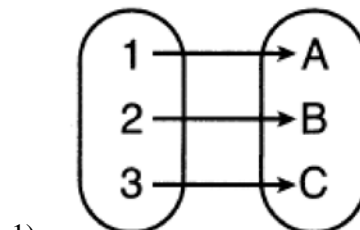
224 Which expression is equivalent to  $18x^2 - 50$ ?

- 1)  $2(3x + 5)^2$
- 2)  $2(3x - 5)^2$
- 3)  $2(3x - 5)(3x + 5)$
- 4)  $2(3x - 25)(3x + 25)$

225 Which expression is *not* equivalent to  $(5^{2x})^3$ ?

- 1)  $(5^x)^6$
- 2)  $(5^{3x})^2$
- 3)  $(5^5)^x$
- 4)  $(5^2)^{3x}$

226 Which relation is *not* a function?



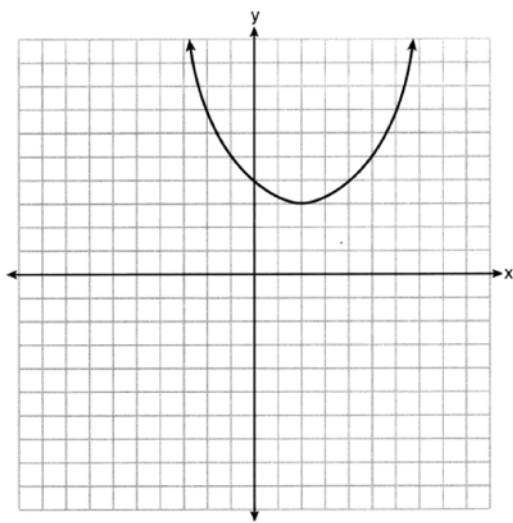
227 Is the product of  $\sqrt{1024}$  and  $-3.4$  rational or irrational? Explain your reasoning.

- 228 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.

	<b>Cheeseburgers</b>	<b>Pizza</b>	<b>Hot Dogs</b>
<b>Females</b>	32	44	24
<b>Males</b>	36	30	34

Based on this survey, what percent of the students preferred pizza?

- 1) 30    3) 44  
 2) 37    4) 74
- 229 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.
- 230 A function is graphed on the set of axes below.



State the domain of this function. State the range of this function.

- 231 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)  $(4x - 9)(x + 3)$
- 232 Subtract  $3x(x - 2y)$  from  $6(x^2 - xy)$  and express your answer as a monomial.
- 233 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*.
- 234 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.

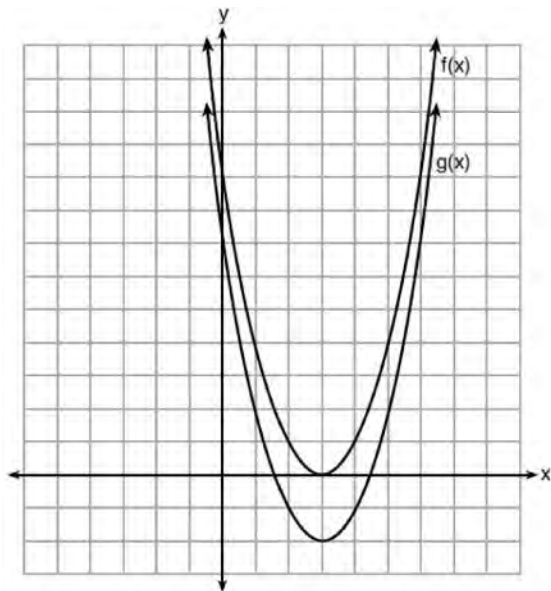
- 235 The table below shows the time, in hours, spent by students on electronic devices and their math test scores. The data collected model a linear regression.

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)  $-0.98$                                       3)  $0.98$   
 2)  $-0.95$                                       4)  $0.95$
- 236 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)  $\frac{1500 \text{ meters}}{15.42 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{1 \text{ meter}}{3.281 \text{ feet}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}}$   
 2)  $\frac{1500 \text{ meters}}{15.42 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{3.281 \text{ feet}}{1 \text{ meter}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}}$   
 3)  $\frac{1500 \text{ meters}}{15.42 \text{ min}} \cdot \frac{3.281 \text{ feet}}{1 \text{ meter}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}}$   
 4)  $\frac{1500 \text{ meters}}{15.42 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{1 \text{ mile}}{5280 \text{ feet}}$
- 237 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)  $5x + 4x^6 + 7$
- 238 The solution to  $3(x - 8) + 4x = 8x + 4$  is
- 1) 12  
 2) 28  
 3)  $-12$   
 4)  $-28$
- 239 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.
- 240 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.

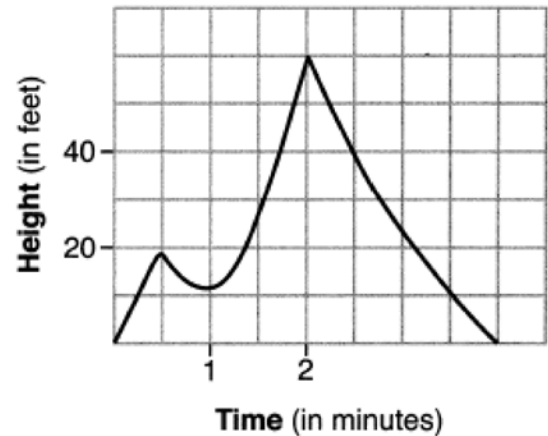
- 241 The functions  $f(x) = x^2 - 6x + 9$  and  $g(x) = f(x) + k$  are graphed below.



Which value of  $k$  would result in the graph of  $g(x)$ ?

- 1) 0
  - 2) 2
  - 3) -3
  - 4) -2
- 242 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
- 243 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.

- 244 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.

- 245 An equation used to find the velocity of an object is given as  $v^2 = u^2 + 2as$ , where  $u$  is the initial velocity,  $v$  is the final velocity,  $a$  is the acceleration of the object, and  $s$  is the distance traveled. When this equation is solved for  $a$ , the result is

- 1)  $a = \frac{v^2 u^2}{2s}$
- 2)  $a = \frac{v^2 - u^2}{2s}$
- 3)  $a = v^2 - u^2 - 2s$
- 4)  $a = 2s(v^2 - u^2)$

- 246 If  $f(x) = 2(3^x) + 1$ , what is the value of  $f(2)$ ?

- 1) 13
- 2) 19
- 3) 37
- 4) 54



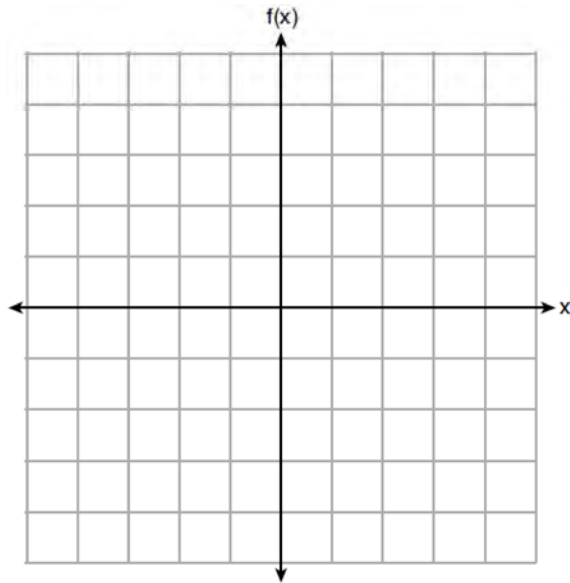
247 Mrs. Smith's math class surveyed students to determine their favorite flavors of soft ice cream. The results are shown in the table below.

	Chocolate	Vanilla	Twist
Juniors	42	27	45
Seniors	67	42	21

Of the students who preferred chocolate, approximately what percentage were seniors?

- 1) 27.5
- 2) 44.7
- 3) 51.5
- 4) 61.5

248 Graph  $f(x) = -\sqrt{x} + 1$  on the set of axes below.



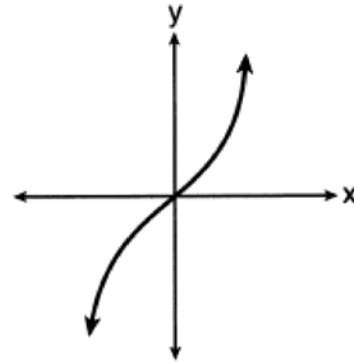
249 The solutions to  $(x + 4)^2 - 2 = 7$  are

- 1)  $-4 \pm \sqrt{5}$
- 2)  $4 \pm \sqrt{5}$
- 3)  $-1$  and  $-7$
- 4)  $1$  and  $7$

250 Which relation is a function?

x	y
-1	1
0	0
1	1
1	2
2	4
3	9

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



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

- 251 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.      3) Andrew has a larger interquartile range than Donna.
- 2) Donna and Andrew have the same median.      4) The 3rd quartile for Donna is greater than the 3rd quartile for Andrew.
- 252 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
- 253 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)  $y \div x$
- 254 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
- 255 Which expression is equivalent to  $(-4x^2)^3$ ?
- 1)  $-12x^6$   
2)  $-12x^5$   
3)  $-64x^6$   
4)  $-64x^5$

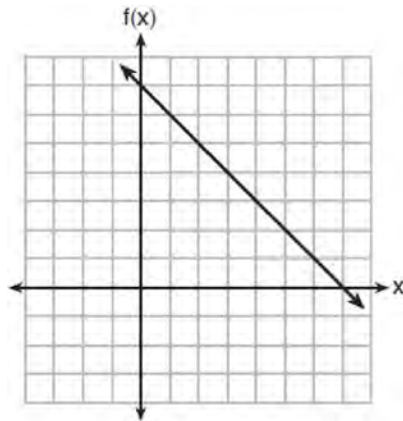
**Algebra I Regents at Random Worksheets**

- 256 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
- 257 The functions  $f(x)$ ,  $q(x)$ , and  $p(x)$  are shown below.



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

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  $p(x)$

258 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
<b>4th Period</b>	77.75	10.79	20	58	69	76.5	87.5	96
<b>6th Period</b>	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.

259 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.

260 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 | 3) 79.7 |
| 2) 13  | 4) 80   |

261 Is the product of two irrational numbers always irrational? Justify your answer.

263 Is the product of  $\sqrt{16}$  and  $\frac{4}{7}$  rational or irrational? Explain your reasoning.

262 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)  $-11.\overline{3}$

264 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)  $6x^3 + 2x^2 - 17$

265 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

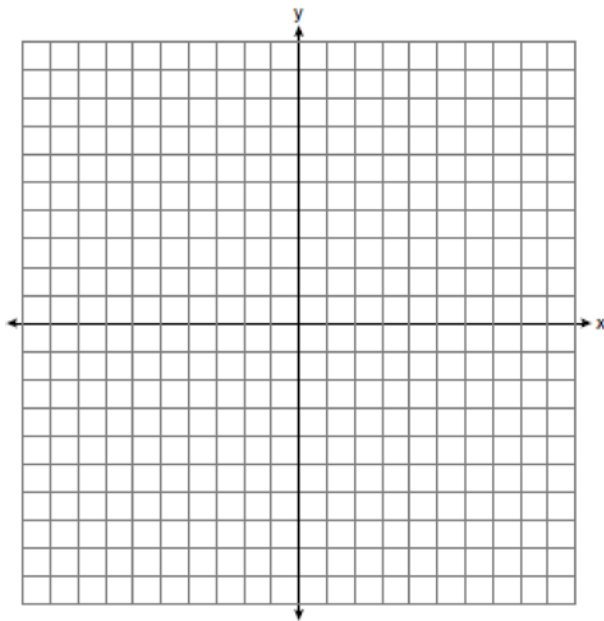
What percentage of the students chose soccer as their favorite sport?

- 1) 39.6%
- 2) 41.4%
- 3) 50.4%
- 4) 58.6%

266 Graph the following systems of inequalities on the set of axes below:

$$2y \geq 3x - 16$$

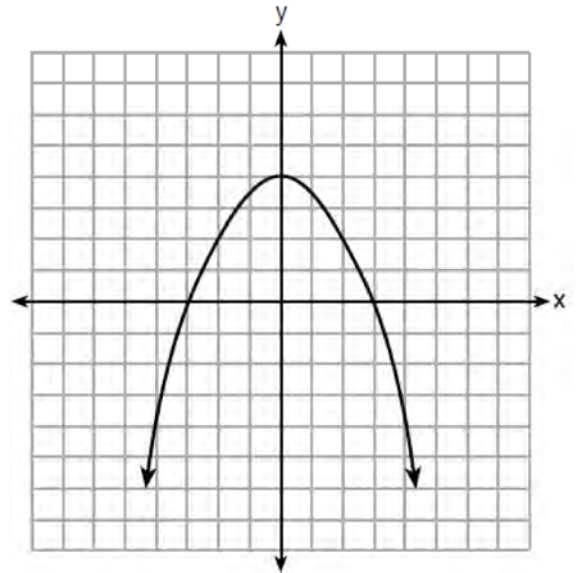
$$y + 2x > -5$$



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.

267 Solve  $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$  for  $x$ .

268 The graph of the function  $p(x)$  is represented below. On the same set of axes, sketch the function  $p(x + 2)$ .



269 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)  $P(c) = .75c - 9.96$

- 270 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)  $3.50P + 2.50H = 14$

$$P + H = 43$$

- 271 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  $K$ .

- 272 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)  $-3x = -30$

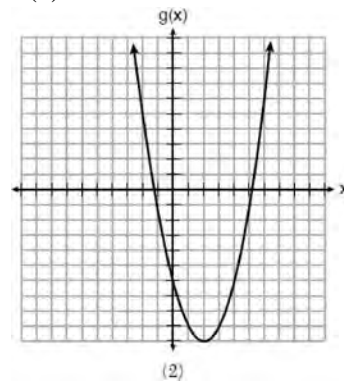
$$x + y = 5$$

4)  $-5y = -5$

$$x - 4y = -10$$

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

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



2)

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

$x$	$f(x)$
-1	-2
0	-5
1	-6
2	-5
3	-2

4)

- 274 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.

- 275 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

- 276 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	Weight in Pounds	Weight in Pounds
$w$	$l(w)$	$p(w)$
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.      3) Liam's pumpkin will weigh more in week 10, and Patricia's pumpkin will weigh more in week 13.
- 2) Patricia's pumpkin will weigh more in week 10 and week 13.      4) Patricia's pumpkin will weigh more in week 10, and Liam's pumpkin will weigh more in week 13.
- 277 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.

<b>Distance From Times Square (city blocks) (x)</b>	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room (dollars) (y)</b>	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.

- 278 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.

<b>Game</b>	13	14	15	16	17	18
<b>Attendance</b>	348	435	522	609	696	783

State the type of function that best fits the given data. Justify your choice of a function type.

- 279 First consider the system of equations  $y = -\frac{1}{2}x + 1$  and  $y = x - 5$ . Then consider the system of inequalities  $y > -\frac{1}{2}x + 1$  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.

- 280 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

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

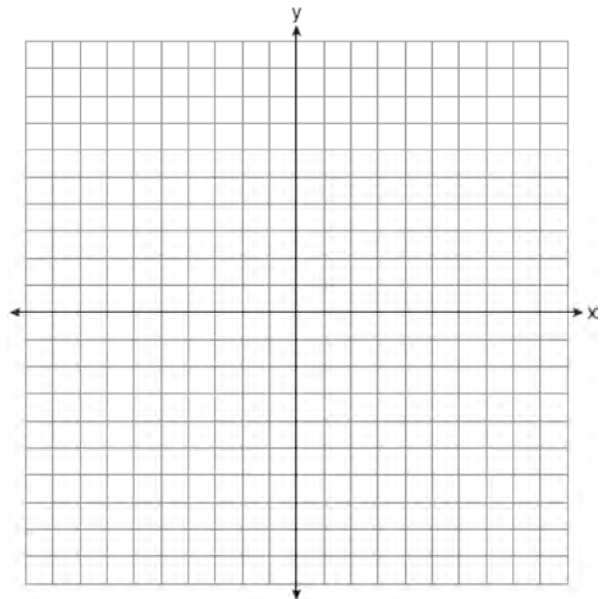
- 282 Which expression results in a rational number?
- 1)  $\sqrt{2} \cdot \sqrt{18}$
  - 2)  $5 \cdot \sqrt{5}$
  - 3)  $\sqrt{2} + \sqrt{2}$
  - 4)  $3\sqrt{2} + 2\sqrt{3}$

- 283 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

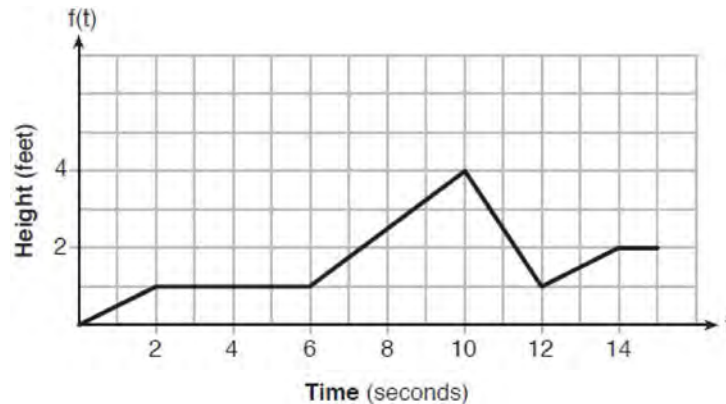
- 284 Graph the function:  $h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 4x - 5, & 0 \leq x \leq 5 \end{cases}$



- 285 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)  $\{0, 4, 92\}$



- 286 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.

- 287 The solution to  $\frac{2}{3}(3-2x) = \frac{3}{4}$  is

- 1)  $-\frac{11}{8}$
- 2)  $\frac{5}{8}$
- 3)  $-\frac{33}{16}$
- 4)  $\frac{15}{16}$

- 288 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  $y = -\frac{1}{2}x - \frac{3}{2}$

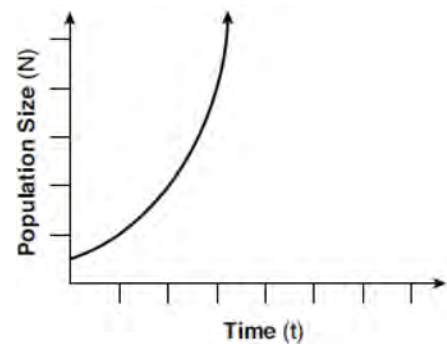
- 289 Solve the equation below algebraically for the exact value of  $x$ .

$$6 - \frac{2}{3}(x+5) = 4x$$

- 290 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)  $(y^2 + 50)(y^2 - 50)$

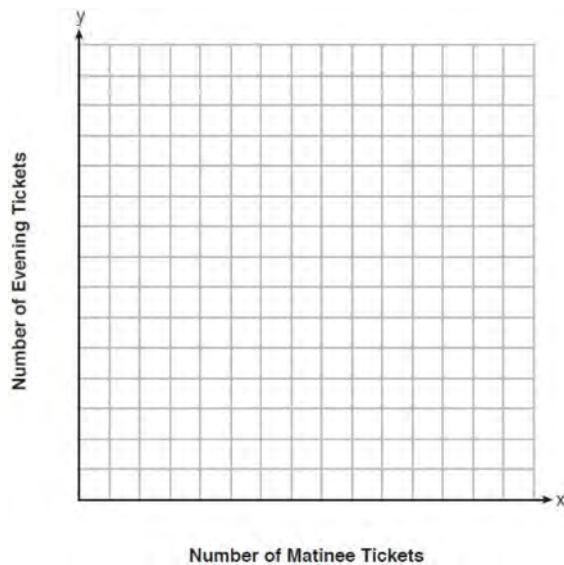
- 291 Which type of function is shown in the graph below?



- 1) linear
- 2) exponential
- 3) square root
- 4) absolute value

- 292 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)  $(3x - 4)(x + 2)$

- 293 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.



What is the maximum number of matinee tickets Myranda could purchase with her gift card? Explain your answer.

- 294 Solve algebraically for  $x$ :  
 $3600 + 1.02x < 2000 + 1.04x$

- 295 A student is in the process of solving an equation. The original equation and the first step are shown below.

$$\text{Original: } 3a + 6 = 2 - 5a + 7$$

$$\text{Step one: } 3a + 6 = 2 + 7 - 5a$$

Which property did the student use for the first step? Explain why this property is correct.

- 296 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)  $(5, 5)$

- 297 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)  $(m + 16)(m - 4)$

- 298 The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:

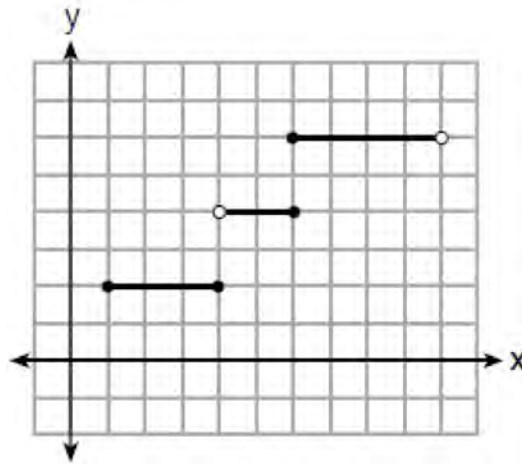
- I. 10 miles
- II. 44,880 feet
- III. 15,560 yards

Which run(s) are at least 15 kilometers?

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

- 299 Determine all the zeros of  $m(x) = x^2 - 4x + 3$ , algebraically.

300 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.

301 The product of  $(x^2 + 3x + 9)$  and  $(x - 3)$  is

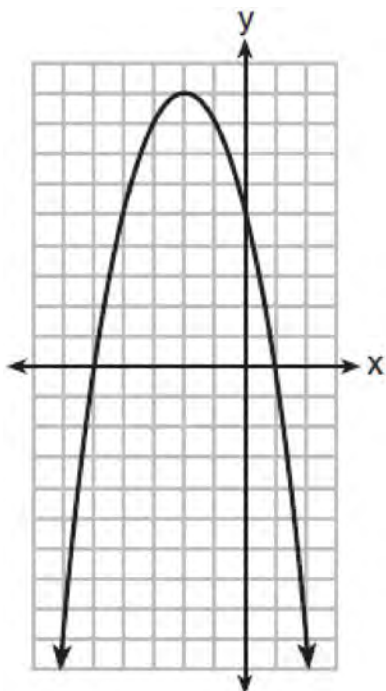
- 1)  $x^3 - 27$
- 2)  $x^2 + 4x + 6$
- 3)  $x^3 - 6x^2 - 18x - 27$
- 4)  $-6x^4 + x^3 - 18x^2 - 27$

302 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

- 303 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.

- 304 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

- 305 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)  $D + Q = 4.80$   
 $.25D + .10Q = 30$

- 306 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

- 307 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.  $\ell = \frac{1}{2}p - w$
- II.  $\ell = \frac{1}{2}(p - 2w)$
- III.  $\ell = \frac{p - 2w}{2}$

Which responses are correct?

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

308 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

309 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)  $\{-16, -4\}$

310 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)  $(x - 4)^2 = 17$

311 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)  $(4w - 1)(w + 3)$

312 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)  $5x^2 - 12x - 2$

313 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

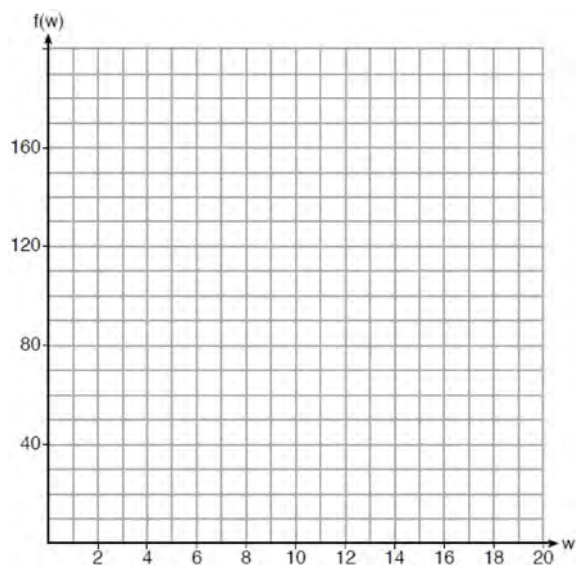
- 1) 0
- 2) 2
- 3) 4.9
- 4) 50

314 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)  $19x^2 + 34x - 29$

315 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

316 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.

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

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

318 Explain how to determine the zeros of  $f(x) = (x + 3)(x - 1)(x - 8)$ . State the zeros of the function.

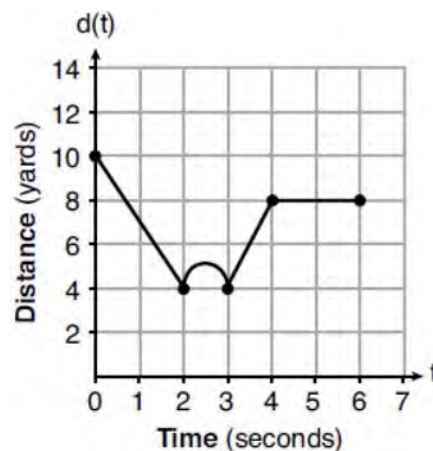
319 Which ordered pair does *not* represent a point on the graph of  $y = 3x^2 - x + 7$ ?

- 1)  $(-1.5, 15.25)$
- 2)  $(0.5, 7.25)$
- 3)  $(1.25, 10.25)$
- 4)  $(2.5, 23.25)$

320 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)  $23(x + 250)$

321 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)  $0 \leq t \leq 2$
- 2)  $2 \leq t \leq 3$
- 3)  $3 \leq t \leq 4$
- 4)  $4 \leq t \leq 6$

322 What is the solution to the inequality

$$2x - 7 > 2.5x + 3?$$

- 1)  $x > -5$
- 2)  $x < -5$
- 3)  $x > -20$
- 4)  $x < -20$

323 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)  $1.25r + 2g < 50$

$$r \leq 10$$

$$g > 12$$

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

$$r \geq 10$$

$$g \geq 12$$

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

$$r \geq 10$$

$$g > 12$$

4)  $1.25r + 2g < 50$

$$r \leq 10$$

$$g \geq 12$$

324 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.

325 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.

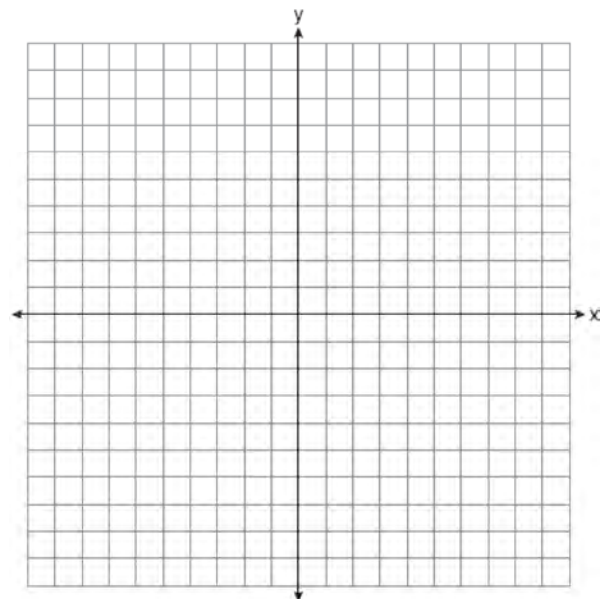
IV. 30 represents the shelter's nonfood expenses per day.

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

326 On the set of axes below, graph the following system of inequalities:

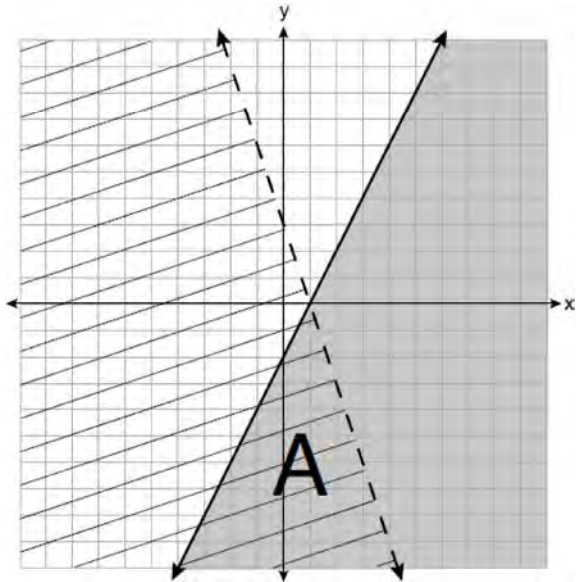
$$2x + y \geq 8$$

$$y - 5 < 3x$$



Determine if the point (1,8) is in the solution set. Explain your answer.

- 327 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.

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

$$\text{Problem: } 3x^2 - 8 - 10x = 3(2x + 3)$$

$$\text{Step 1: } 3x^2 - 10x - 8 = 6x + 9$$

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

- 329 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)  $\{0, -1, 1, -16, 16, -81, 81\}$

- 330 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.

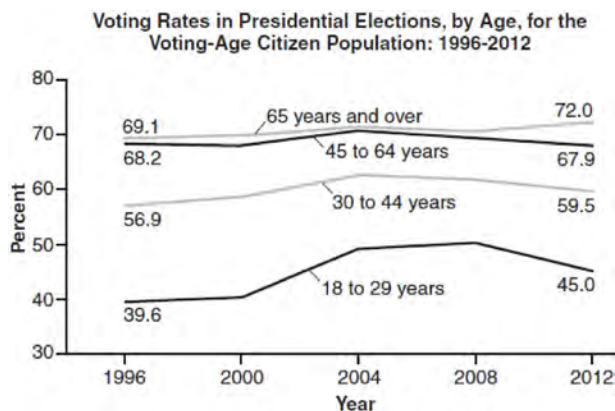
- 331 At the present time, Mrs. Bee's age is six years more than four times her son's age. Three years ago, she was seven times as old as her son was then. If  $b$  represents Mrs. Bee's age now and  $s$  represents her son's age now, write a system of equations that could be used to model this scenario. 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.

- 332 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.



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

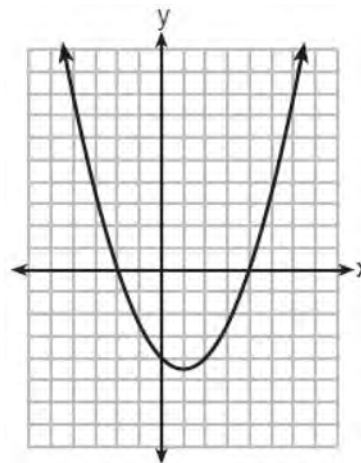


Which statement does *not* correctly interpret voting rates by age based on the given graph?

- For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.
  - From 1996-2012, the average rate of change was positive for only two age groups.
  - About 70% of people 45 and older voted in the 2004 election.
  - The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.
- 334 The expression  $16x^2 - 81$  is equivalent to
- $(8x - 9)(8x + 9)$
  - $(8x - 9)(8x - 9)$
  - $(4x - 9)(4x + 9)$
  - $(4x - 9)(4x - 9)$

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

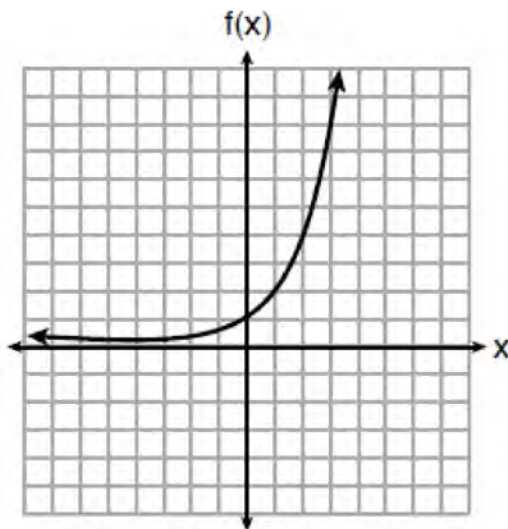
- 336 The graph of  $y = \frac{1}{2}x^2 - x - 4$  is shown below. The points  $A(-2, 0)$ ,  $B(0, -4)$ , and  $C(4, 0)$  lie on this graph.



Which of these points can determine the zeros of the equation  $y = \frac{1}{2}x^2 - x - 4$ ?

- A, only
  - B, only
  - A and C, only
  - A, B, and C
- 337 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?
- 0.125
  - 0.25
  - 0.333
  - 0.405
- 338 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.

339 Three functions are shown below.



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

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  $h(x)$ .

340 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)

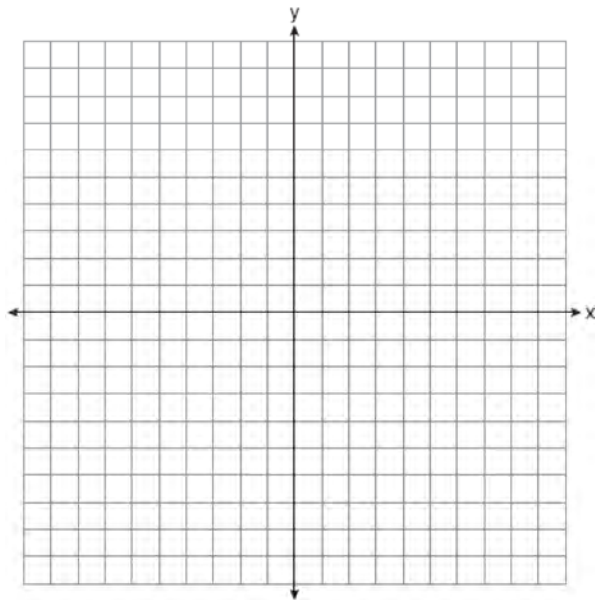
341 The expression  $w^4 - 36$  is equivalent to

- 1)  $(w^2 - 18)(w^2 - 18)$
- 2)  $(w^2 + 18)(w^2 - 18)$
- 3)  $(w^2 - 6)(w^2 - 6)$
- 4)  $(w^2 + 6)(w^2 - 6)$

- 342 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.

- 343 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)  $1.75x + 1.60y \geq 10$

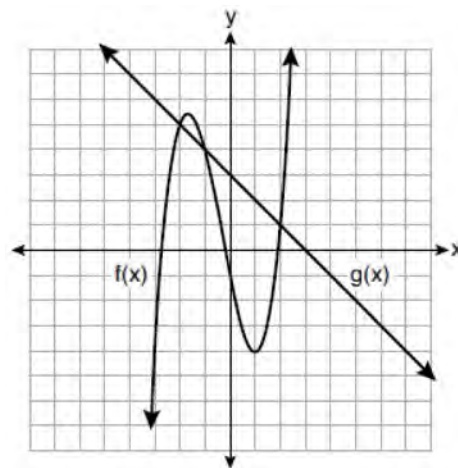
- 344 Is the solution to the quadratic equation written below rational or irrational? Justify your answer.

$$0 = 2x^2 + 3x - 10$$

- 345 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.

- 346 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)  $-2$

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

- 1)  $\frac{6}{11}$
- 2)  $2$
- 3)  $-\frac{10}{7}$
- 4)  $-2$

- 348 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
- 349 Which quadratic function has the largest maximum over the set of real numbers?

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

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

2)

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

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

4)

- 350 Which equation is equivalent to  $y = x^2 + 24x - 18$ ?

1)  $y = (x + 12)^2 - 162$

2)  $y = (x + 12)^2 + 126$

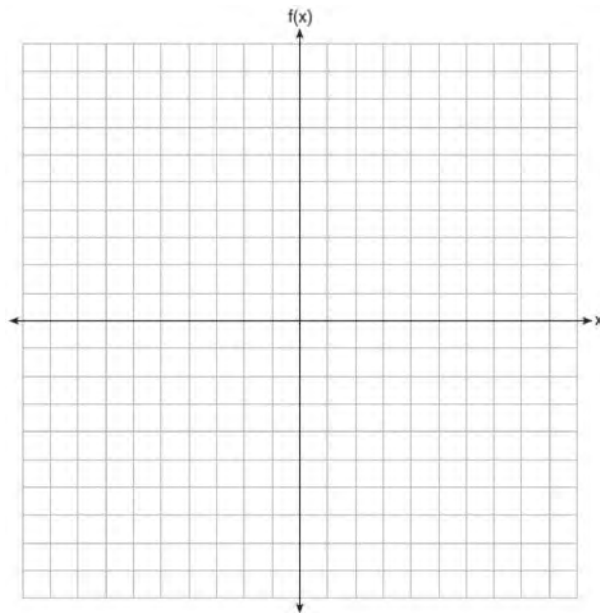
3)  $y = (x - 12)^2 - 162$

4)  $y = (x - 12)^2 + 126$

- 351 Solve for  $x$  to the *nearest tenth*:  $x^2 + x - 5 = 0$ .

- 352 Graph the following piecewise function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -5 \leq x < 2 \\ -2x + 10, & 2 \leq x \leq 6 \end{cases}$$



- 353 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

- 354 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

- 355 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
- 356 Given the set  $\{x \mid -2 \leq x \leq 2, \text{ where } x \text{ is an integer}\}$ , what is the solution of  $-2(x - 5) < 10$ ?
- 1) 0, 1, 2
  - 2) 1, 2
  - 3) -2, -1, 0
  - 4) -2, -1
- 357 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
- 358 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)
- 359 The number of bacteria grown in a lab can be modeled by  $P(t) = 300 \cdot 2^{4t}$ , where  $t$  is the number of hours. Which expression is equivalent to  $P(t)$ ?
- 1)  $300 \cdot 8^t$
  - 2)  $300 \cdot 16^t$
  - 3)  $300^t \cdot 2^4$
  - 4)  $300^{2t} \cdot 2^{2t}$
- 360 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)  $a = 2a - 7$
- 361 For the sequence  $-27, -12, 3, 18, \dots$ , 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)  $-27 + 15(n - 1)$
- 362 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.
- 363 Solve  $5x^2 = 180$  algebraically.

364 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

365 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

366 Joe deposits \$4000 into a certificate of deposit (CD) at his local bank. The CD earns 3% interest, compounded annually. The value of the CD in  $x$  years can be found using the function

- 1)  $f(x) = 4000 + 0.3x$
- 2)  $f(x) = 4000 + 0.03x$
- 3)  $f(x) = 4000(1.3)^x$
- 4)  $f(x) = 4000(1.03)^x$

367 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)  $-2x^2 + x - 5$

368 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

369 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

- 370 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.      3) The median is 53.  
 2) The data have two outliers.      4) The range is 120.
- 371 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

<b>Mathematics</b>	55	93	89	60	90	45	64	76	89
<b>Physics</b>	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.

- 372 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.      3)  $V(x) = 4(1.35)^x$  and it grows.  
 2)  $V(x) = 4(0.65)^x$  and it decays.      4)  $V(x) = 4(1.35)^x$  and it decays.
- 373 If  $f(x) = 4x + 5$ , what is the value of  $f(-3)$ ?
- 1)  $-2$   
 2)  $-7$   
 3)  $17$   
 4)  $4$
- 374 Solve the following equation by completing the square:  $x^2 + 4x = 2$

- 375 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.

- 376 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
- 377 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
- 378 If  $f(x) = 2x + 6$  and  $g(x) = |x|$  are graphed on the same coordinate plane, for which value of  $x$  is  $f(x) = g(x)$ ?
- 1) 6
  - 2) 2
  - 3) -2
  - 4) -6
- 379 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)  $A(t) = 5000(1.013)^t (1.013)^{25}$
- 380 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)  $0 = 2x(x - 1) - 3(x + 1)$
- 381 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



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

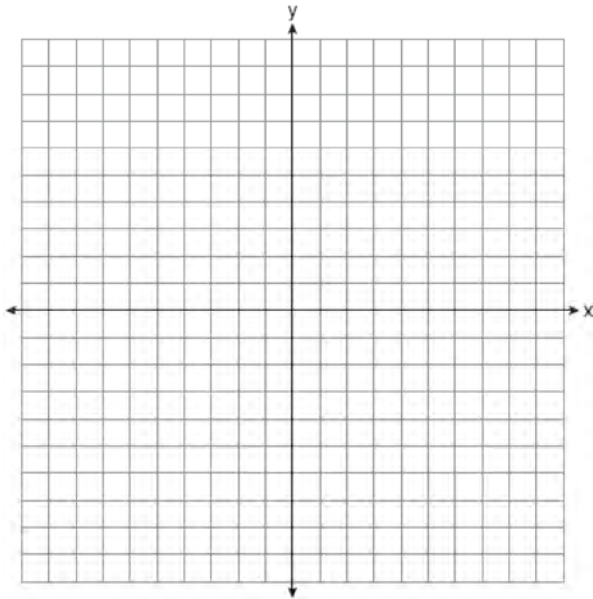
$x$	$r(x)$
-4	-12
-3	-15
-2	-16
-1	-15
0	-12
1	7

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

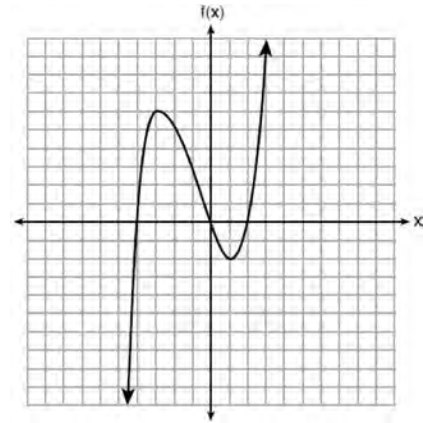
The function with the *smaller* minimum value is

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| 1) $q(x)$ , and the value is $-9$ | 3) $r(x)$ , and the value is $-16$ |
| 2) $q(x)$ , and the value is $-1$ | 4) $r(x)$ , and the value is $-2$  |

383 Graph  $f(x) = \sqrt{x+2}$  over the domain  $-2 \leq x \leq 7$ .



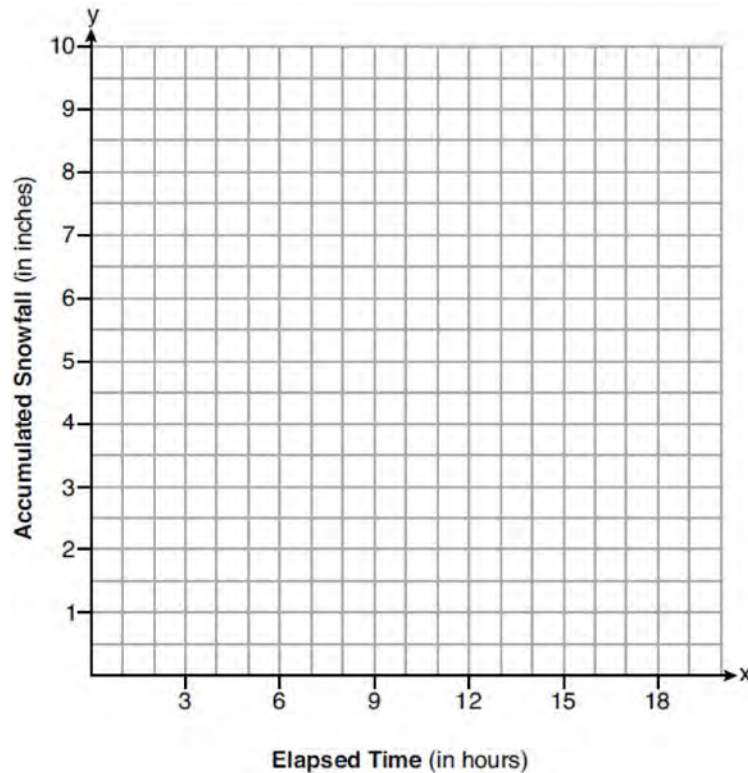
384 The graph of  $f(x)$  is shown below.



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

- 1) 6
- 2) 2
- 3) -2
- 4) -4

- 385 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.



Determine the average rate of snowfall over the length of the storm. State the rate, to the *nearest hundredth of an inch per hour*.

- 386 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  $\leq 0$
  - 2) an integer  $\geq 0$
  - 3) a rational number  $\leq 0$
  - 4) a rational number  $\geq 0$
- 387 If  $f(x) = x^2 + 2$ , which interval describes the range of this function?
- 1)  $(-\infty, \infty)$
  - 2)  $[0, \infty)$
  - 3)  $[2, \infty)$
  - 4)  $(-\infty, 2]$

- 388 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.

<b>Mass (kg)</b>	4.5	5	4	3.5	5.5	5	5	4	4	6	3.5	5.5
<b>Height (cm)</b>	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.

- 389 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.
- 390 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
- 391 The expression  $4x^2 - 25$  is equivalent to
- 1)  $(4x - 5)(x + 5)$
  - 2)  $(4x + 5)(x - 5)$
  - 3)  $(2x + 5)(2x - 5)$
  - 4)  $(2x - 5)(2x - 5)$
- 392 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%
- 393 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)  $2x^2 - 4$
- 394 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)  $I = \left(\frac{P}{R}\right)^2$
  - 2)  $I = \sqrt{\frac{P}{R}}$
  - 3)  $I = (P - R)^2$
  - 4)  $I = \sqrt{P - R}$

395 A system of equations is shown below.

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

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

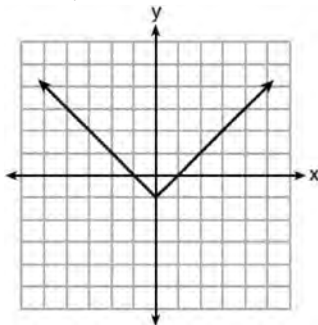
Which method eliminates one of the variables?

- 1) Multiply equation A by  $-\frac{1}{3}$  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.

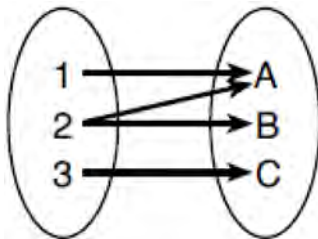
396 Which relation is *not* a function?

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

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



3)

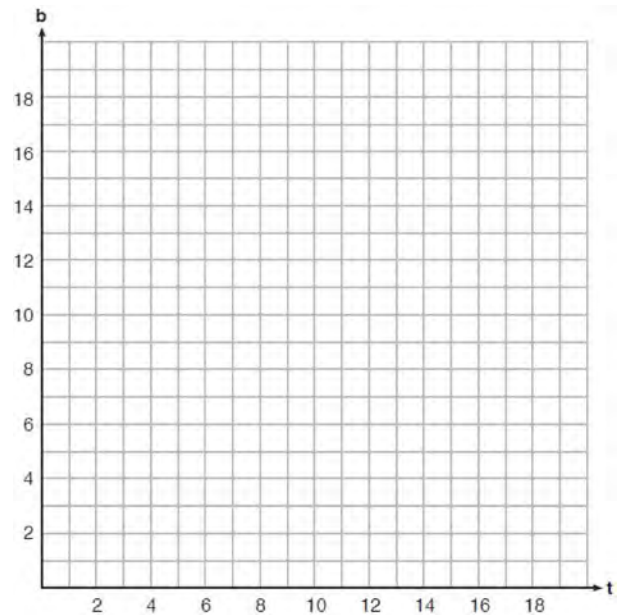


4)

397 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)  $2a^2 - a - 11$

398 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.

399 How many real-number solutions does

$$4x^2 + 2x + 5 = 0$$
 have?

- 1) one
- 2) two
- 3) zero
- 4) infinitely many

400 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.

401 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)  $A(w) = 4w^2 + 28w$

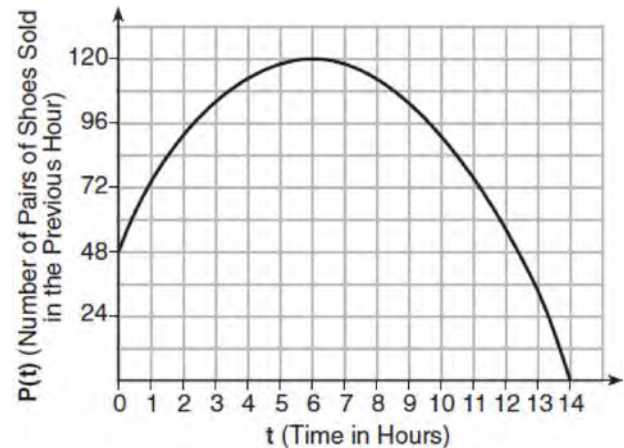
402 Three expressions are written below.

- A.  $(2xy^2)^3$
- B.  $(2x)^3y^6$
- C.  $(2x^2y^2)(4xy^3)$

Which expressions are equivalent to  $8x^3y^6$ ?

- 1) A and B, only
- 2) B and C, only
- 3) A and C, only
- 4) A, B, and C

403 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.

404 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.  $12x^3 + 8x + 4$

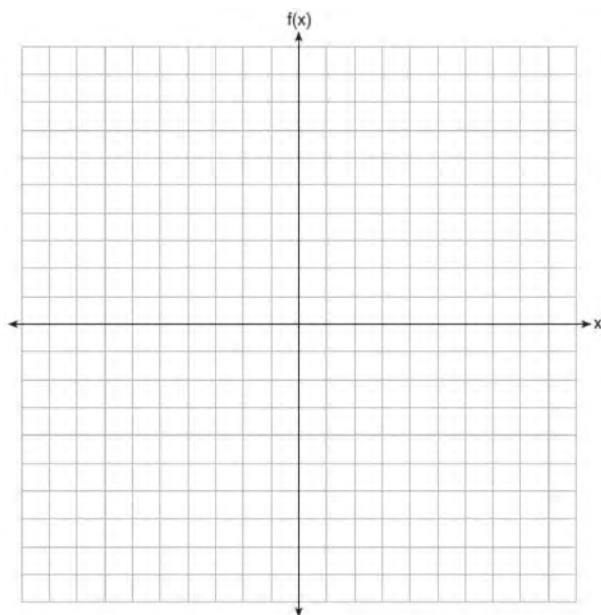
III.  $2x^5 + 8x^2 + 10x$

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.

- 405 On the set of axes below, graph the piecewise function:

$$f(x) = \begin{cases} -\frac{1}{2}x, & x < 2 \\ x, & x \geq 2 \end{cases}$$



- 406 The value of  $x$  that satisfies the equation

$$\frac{4}{3} = \frac{x+10}{15}$$

- 1) -6
- 2) 5
- 3) 10
- 4) 30

- 407 Using the substitution method, Vito is solving the following system of equations algebraically:

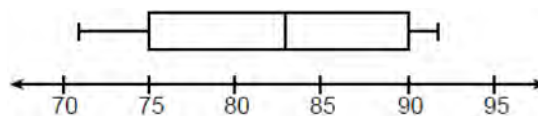
$$y + 3x = -4$$

$$2x - 3y = -21$$

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

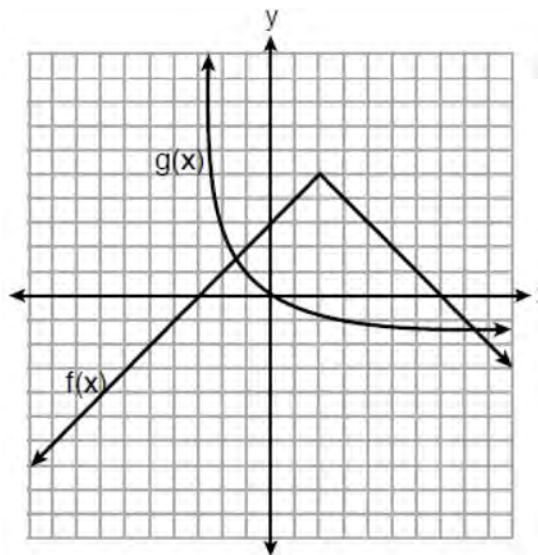
- 408 The box plot below summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida.



The third quartile is

- 1) 92
- 2) 90
- 3) 83
- 4) 71

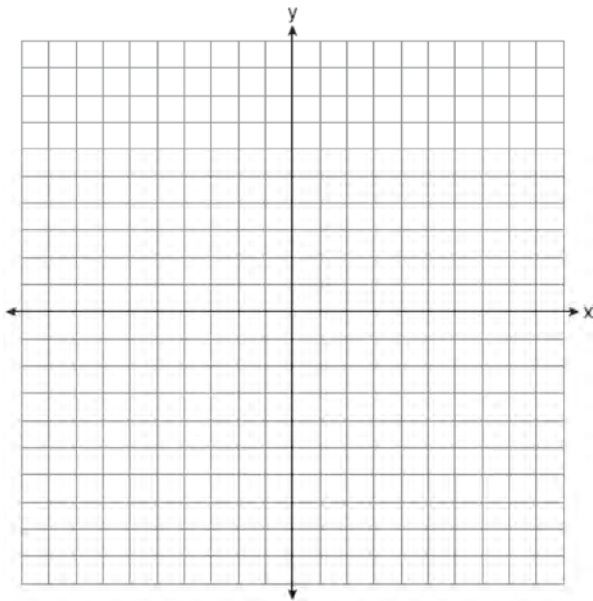
- 409 The functions  $f(x)$  and  $g(x)$  are graphed below.



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

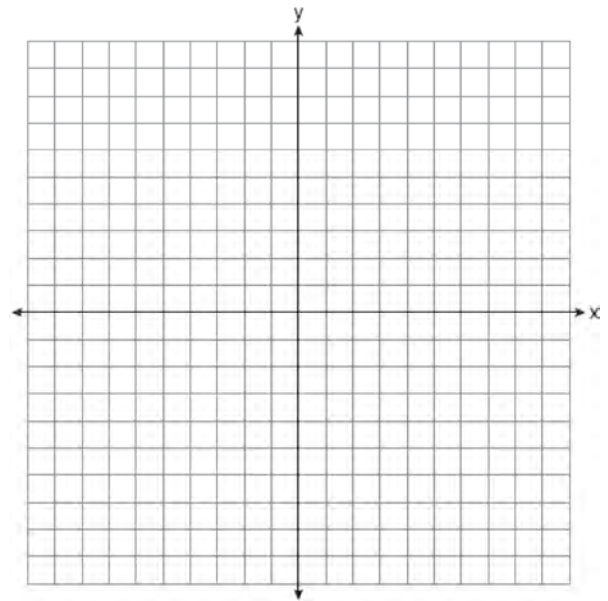
- 410 The product of  $\sqrt{576}$  and  $\sqrt{684}$  is
- 1) irrational because both factors are irrational
  - 2) rational because both factors are rational
  - 3) irrational because one factor is irrational
  - 4) rational because one factor is rational
- 411 The formula for the volume of a cone is  $V = \frac{1}{3} \pi r^2 h$ . Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .
- 412 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  $k$ .

- 413 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)  $45$

- 414 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
- 415 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.

- 416 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.



417 Caleb claims that the ordered pairs shown in the table below are from a nonlinear function.

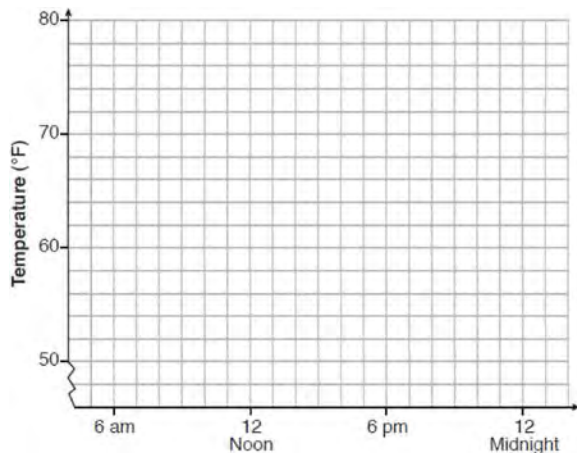
$x$	$f(x)$
0	2
1	4
2	8
3	16

State if Caleb is correct. Explain your reasoning.

418 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  $50^{\circ}\text{F}$ . For the next 4 hours, the temperature rose  $3^{\circ}$  per hour. The next 6 hours, it rose  $2^{\circ}$  per hour. The temperature then stayed steady until 6 p.m. For the next 2 hours, the temperature dropped  $1^{\circ}$  per hour. The temperature then dropped steadily until the temperature was  $56^{\circ}\text{F}$  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.

419 The roots of  $x^2 - 5x - 4 = 0$  are

- 1) 1 and 4
- 2)  $\frac{5 \pm \sqrt{41}}{2}$
- 3) -1 and -4
- 4)  $\frac{-5 \pm \sqrt{41}}{2}$

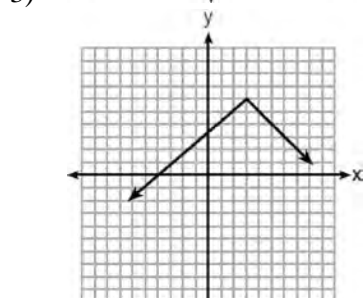
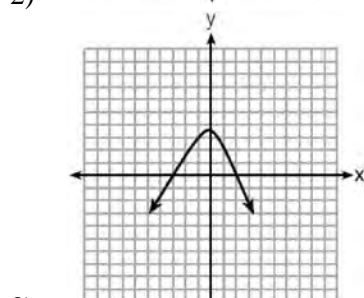
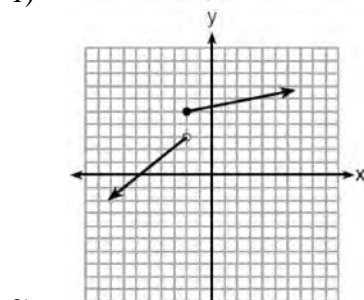
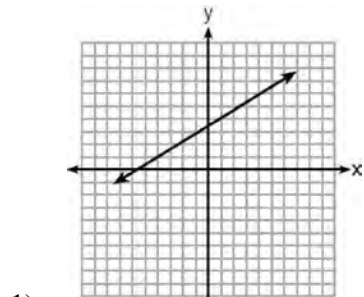
420 At Bea's Pet Shop, the number of dogs,  $d$ , is initially five less than twice the number of cats,  $c$ . If she decides to add three more of each, the ratio of cats to dogs will be  $\frac{3}{4}$ . Write an equation or system of equations that can be used to find the number of cats and dogs Bea 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.

421 Solve the quadratic equation below for the exact values of  $x$ .

$$4x^2 - 5 = 75$$



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



423 The trinomial  $x^2 - 14x + 49$  can be expressed as

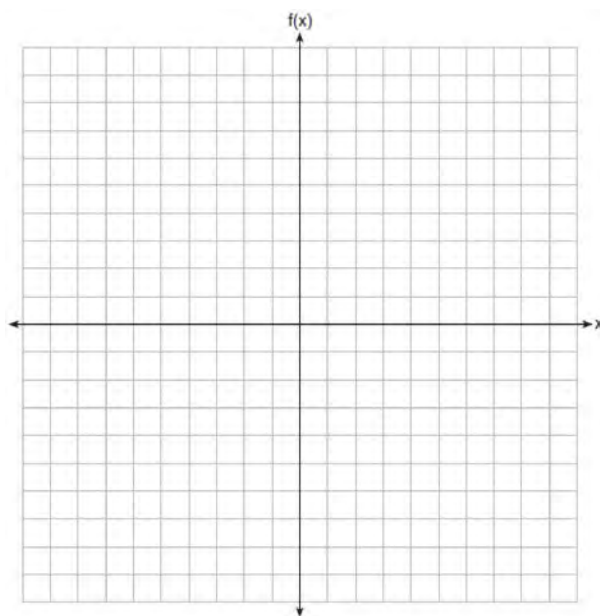
- 1)  $(x - 7)^2$
- 2)  $(x + 7)^2$
- 3)  $(x - 7)(x + 7)$
- 4)  $(x - 7)(x + 2)$

424 When the function  $g(x) = \begin{cases} 5x, & x \leq 3 \\ x^2 + 4, & x > 3 \end{cases}$  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  $(3, 13)$

425 On the set of axes below, graph  $f(x) = |x - 3| + 2$ .



- 426 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.

<b>Washington, D.C.</b>	
<b>Time</b>	<b>Snow (inches)</b>
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.
- 427 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.

<b>Years After Purchase</b>	<b>Value in Dollars</b>
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)  $f(x) = 1000(1.2)^x$                       3)  $f(x) = 1250(1.2)^x$   
2)  $f(x) = 1000(0.8)^x$                       4)  $f(x) = 1250(0.8)^x$
- 428 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.

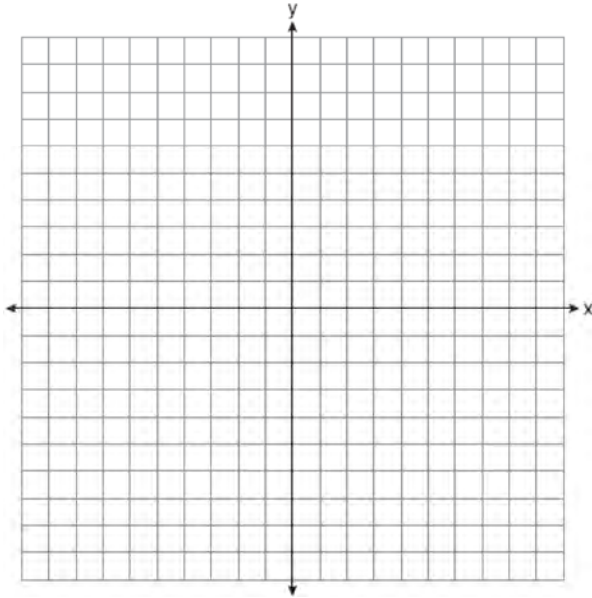
	<b>Niagara Falls</b>	<b>Darien Lake</b>	<b>New York City</b>
<b>Boys</b>	56	74	103
<b>Girls</b>	71	92	88

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

- 429 On the set of axes below, graph the following system of inequalities:

$$2y + 3x \leq 14$$

$$4x - y < 2$$



Determine if the point  $(1, 2)$  is in the solution set. Explain your answer.

- 430 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.

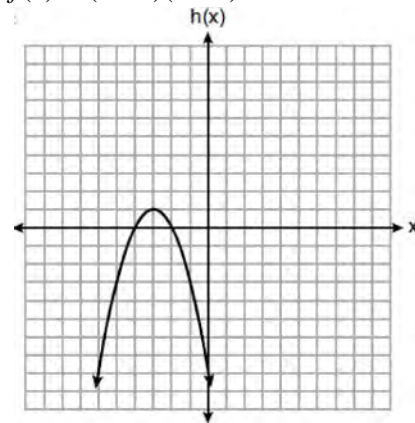
- 431 Solve  $x^2 - 8x - 9 = 0$  algebraically. Explain the first step you used to solve the given equation.

- 432 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.

- 433 Three functions are shown below.

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

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.
- 434 When factored completely,  $-x^3 + 10x^2 + 24x$  is
- 1)  $-x(x + 4)(x - 6)$
  - 2)  $-x(x - 4)(x - 6)$
  - 3)  $-x(x + 2)(x - 12)$
  - 4)  $-x(x - 2)(x + 12)$

- 435 Solve algebraically for  $x$ :

$$-\frac{2}{3}(x + 12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

436 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.

437 The formula  $F_g = \frac{GM_1M_2}{r^2}$  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  $M_2$ .

438 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)  $-4 \pm \sqrt{24}$

439 If  $k(x) = 2x^2 - 3\sqrt{x}$ , then  $k(9)$  is

- 1) 315
- 2) 307
- 3) 159
- 4) 153

440 Given the following three sequences:

I. 2, 4, 6, 8, 10...

II. 2, 4, 8, 16, 32...

III.  $a, a + 2, a + 4, a + 6, a + 8, \dots$

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

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

$$x - y = 3$$

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

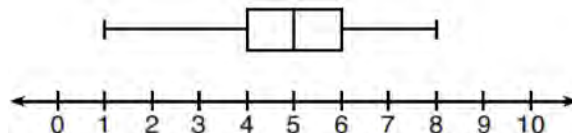
- 1)  $-2x - 2y = -6$   
 $2x - 3y = -1$
- 2)  $-2x + 2y = 3$   
 $2x - 3y = -1$
- 3)  $2x - 2y = 6$   
 $2x - 3y = -1$
- 4)  $3x + 3y = 9$   
 $2x - 3y = -1$

442 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.

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



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

444 Santina is considering a vacation and has obtained high-temperature data from the last two weeks for Miami and Los Angeles.

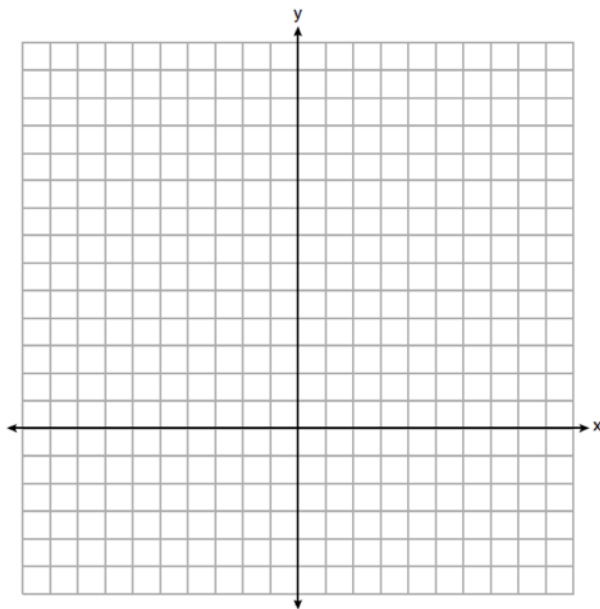
<b>Miami</b>	76	75	83	73	60	66	76
	81	83	85	83	87	80	80
<b>Los Angeles</b>	74	63	65	67	65	65	65
	62	62	72	69	64	64	61

Which location has less variability in temperatures? Explain how you arrived at your answer.

445 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  $f(x) = g(x)$ .

446 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.

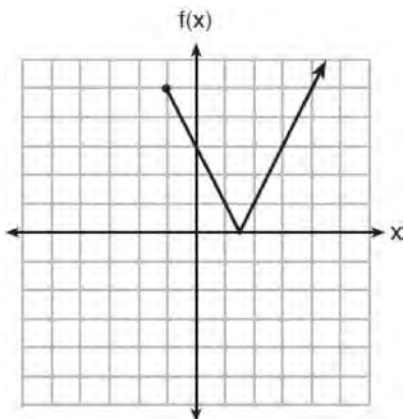
447 The owner of a landscaping business wants to know how much time, on average, his workers spend mowing one lawn. Which is the most appropriate rate with which to calculate an answer to his question?

- 1) lawns per employee
- 2) lawns per day
- 3) employee per lawns
- 4) hours per lawn

448 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

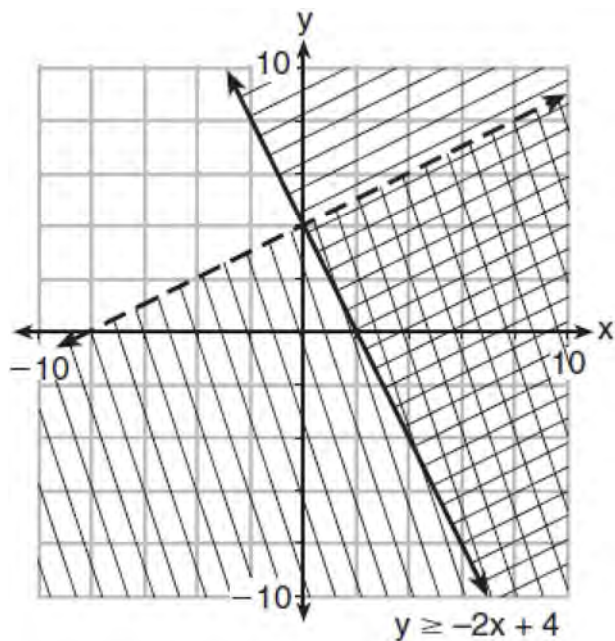
449 The function  $f(x)$  is graphed below.



The domain of this function is

- 1) all positive real numbers
- 2) all positive integers
- 3)  $x \geq 0$
- 4)  $x \geq -1$

450 Determine if the point  $(0, 4)$  is a solution to the system of inequalities graphed below. Justify your answer.



451 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)

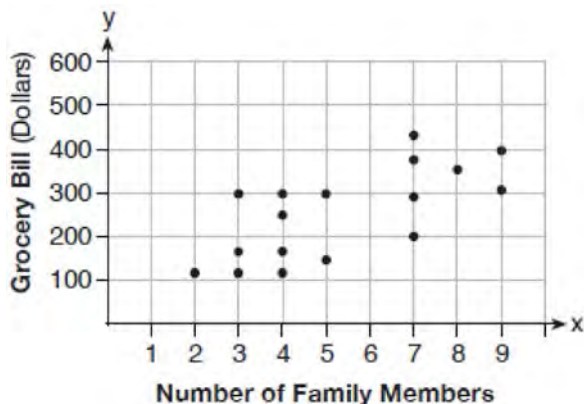
- 452 The table below represents the height of a bird above the ground during flight, with  $P(t)$  representing height in feet and  $t$  representing time in seconds.

$t$	$P(t)$
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.

- 453 The formula  $a = \frac{v_f - v_i}{t}$  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,  $t$ .

- 454 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

- 455 If  $g(x) = -4x^2 - 3x + 2$ , determine  $g(-2)$ .

- 456 What is the solution to the equation

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

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

- 457 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)  $26$

- 458 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.



459 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:

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

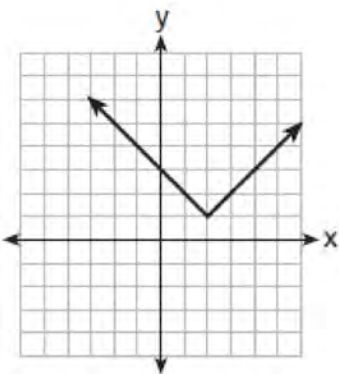
Which ratio is *incorrectly* written in Olivia's conversion?

- 1)  $\frac{4 \text{ quarts}}{1 \text{ gallon}}$
- 2)  $\frac{2 \text{ pints}}{1 \text{ quart}}$
- 3)  $\frac{\frac{1}{4} \text{ cup}}{4 \text{ tablespoons}}$
- 4)  $\frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$

460 Which relation does *not* represent a function?

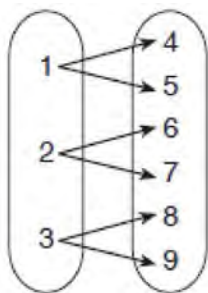
x	1	2	3	4	5	6
y	3.2	4	5.1	6	7.4	8.8

1)



2)

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



4)

461 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

462 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)  $P(t) = 26,670(1.0035)^t$

463 The following conversion was done correctly:

$$\frac{3 \text{ miles}}{1 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

What were the final units for this conversion?

- 1) minutes per foot
- 2) minutes per inch
- 3) feet per minute
- 4) inches per minute

464 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)  $2(x + 3)(x + 2)$



- 465 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  $f(x)$

466 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.

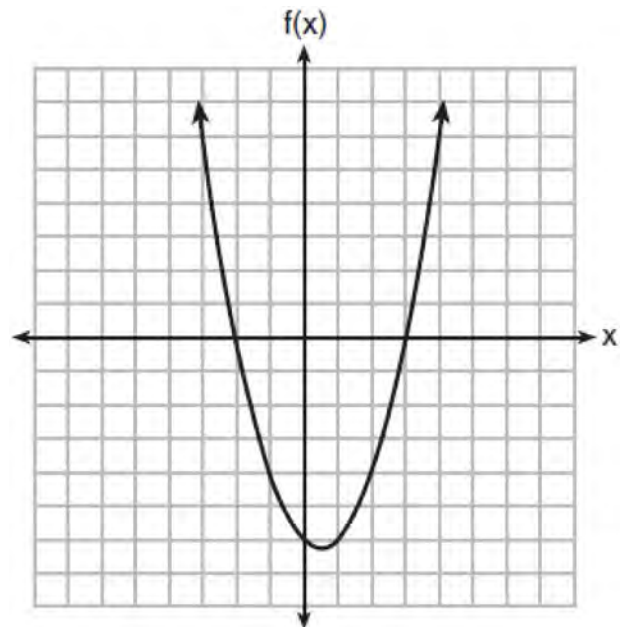
- 467 Which ordered pair would *not* be a solution to  $y = x^3 - x$ ?
- 1)  $(-4, -60)$
  - 2)  $(-3, -24)$
  - 3)  $(-2, -6)$
  - 4)  $(-1, -2)$

- 468 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)  $3\sqrt{5} + 2\sqrt{5}$

469 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.

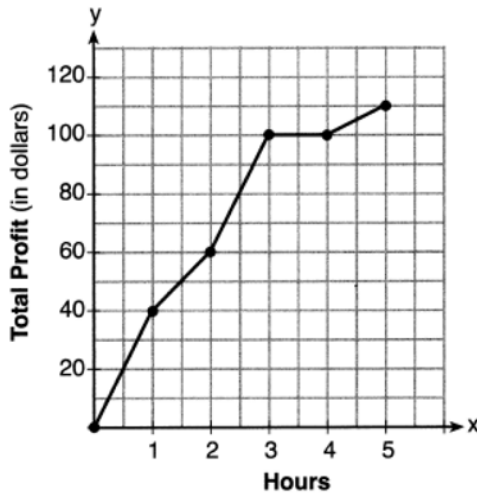
- 470 A grocery store sells packages of beef. The function  $C(w)$  represents the cost, in dollars, of a package of beef weighing  $w$  pounds. The most appropriate domain for this function would be
- 1) integers
  - 2) rational numbers
  - 3) positive integers
  - 4) positive rational numbers

471 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*.

- 472 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  $1 \leq x \leq 4$ .

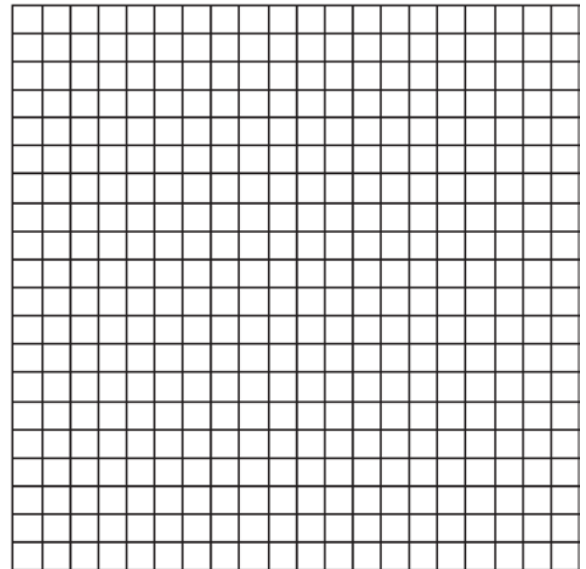
- 473 When  $(x)(x - 5)(2x + 3)$  is expressed as a polynomial in standard form, which statement about the resulting polynomial is true?
- 1) The constant term is 2.
  - 2) The leading coefficient is 2.
  - 3) The degree is 2.
  - 4) The number of terms is 2.

- 474 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)  $600(1 - 0.024)^4$

- 475 The amount of energy,  $Q$ , in joules, needed to raise the temperature of  $m$  grams of a substance is given by the formula  $Q = mC(T_f - T_i)$ , where  $C$  is the specific heat capacity of the substance. If its initial temperature is  $T_i$ , an equation to find its final temperature,  $T_f$ , is

- 1)  $T_f = \frac{Q}{mC} - T_i$
- 2)  $T_f = \frac{Q}{mC} + T_i$
- 3)  $T_f = \frac{T_i + Q}{mC}$
- 4)  $T_f = \frac{Q - mC}{T_i}$

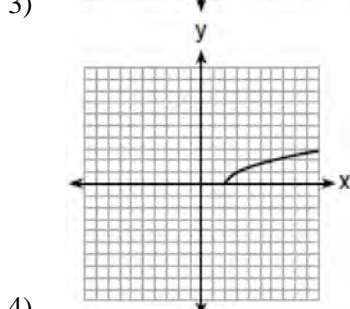
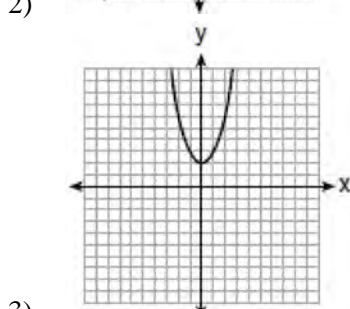
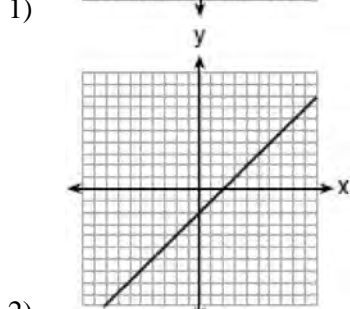
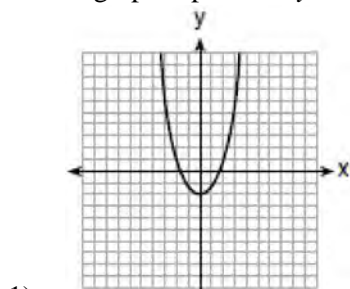
- 476 Graph  $f(x) = |x|$  and  $g(x) = -x^2 + 6$  on the grid below. Does  $f(-2) = g(-2)$ ? Use your graph to explain why or why not.



- 477 Determine and state whether the sequence  $1, 3, 9, 27, \dots$  displays exponential behavior. Explain how you arrived at your decision.

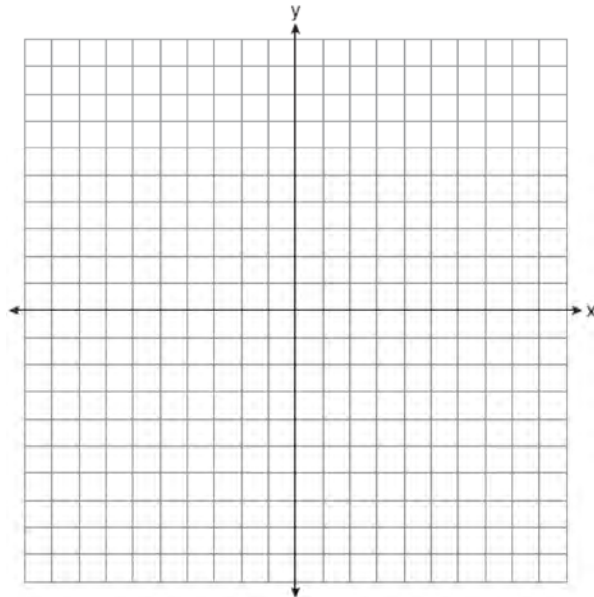
**Algebra I Regents at Random Worksheets**

477 Which graph represents  $y = \sqrt{x-2}$ ?



478 Using the formula for the volume of a cone, express  $r$  in terms of  $V$ ,  $h$ , and  $\pi$ .

479 Graph the function  $y = -\sqrt{x+3}$  on the set of axes below.



480 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.

481 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)  $(15)(18) = 120 + x^2$

- 482 A part of Jennifer's work to solve the equation

$$2(6x^2 - 3) = 11x^2 - x \text{ is shown below.}$$

$$\text{Given: } 2(6x^2 - 3) = 11x^2 - x$$

$$\text{Step 1: } 12x^2 - 6 = 11x^2 - x$$

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

- 483 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)  $8x + 4y = 44$   
 $-8x + 8y = -8$

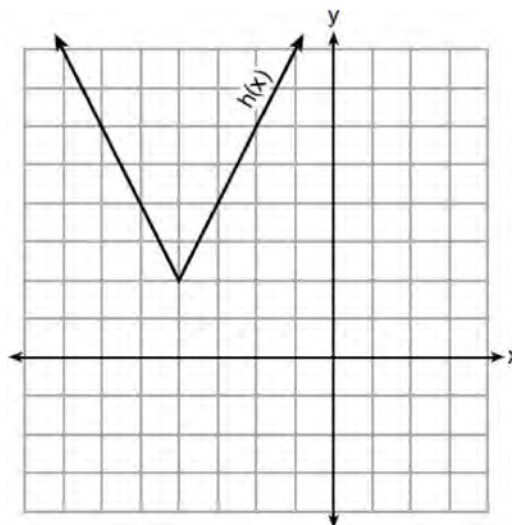
- 484 Mario's \$15,000 car depreciates in value at a rate of 19% per year. The value,
- $V$
- , after
- $t$
- years can be modeled by the function
- $V = 15,000(0.81)^t$
- . Which function is equivalent to the original function?

- 1)  $V = 15,000(0.9)^{9t}$
- 2)  $V = 15,000(0.9)^{2t}$
- 3)  $V = 15,000(0.9)^{\frac{t}{9}}$
- 4)  $V = 15,000(0.9)^{\frac{t}{2}}$

- 485 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

- 486 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

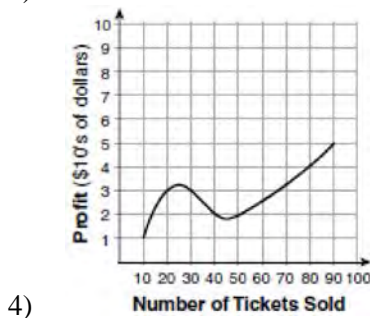
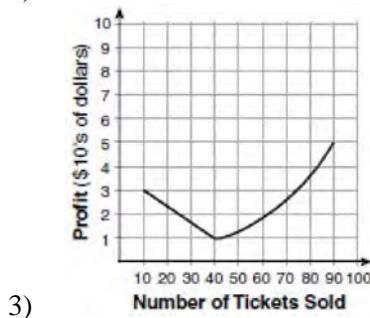
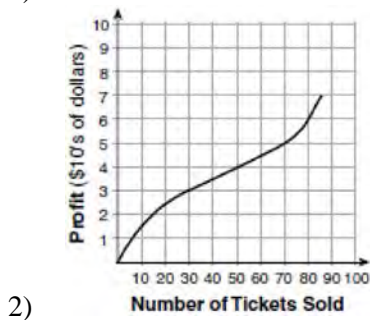
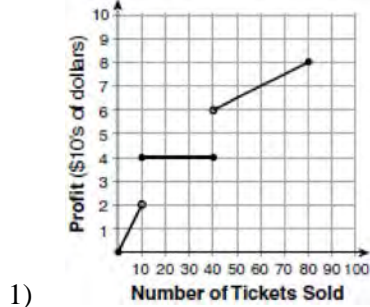
- 487 Which equation and ordered pair represent the correct vertex form and vertex for

$$j(x) = x^2 - 12x + 7?$$

- 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)



491 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?



492 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

493 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.]

494 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)  $x^2 - 8(x - 1) = 17$

495 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

496 Solve the equation for  $y$ :  $(y - 3)^2 = 4y - 12$

497 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)  $\{-2, -1, 0, 0, 1, 1, 1, 2, 4, 4\}$

498 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

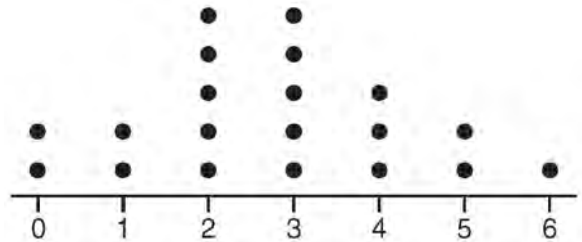
499 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min. If  $t$  represents the number of minutes on the treadmill and  $b$  represents the number of minutes on the stationary bike, which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

- 1)  $b$
- 2)  $5b$
- 3)  $45 - b$
- 4)  $250 - 5b$

500 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

501 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.

502 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)  $\frac{I - P}{t}$
- 2)  $\frac{P - I}{t}$
- 3)  $\frac{I}{Pt}$
- 4)  $\frac{Pt}{I}$

503 What is the solution set of the equation  $(x - 2)(x - a) = 0$ ?

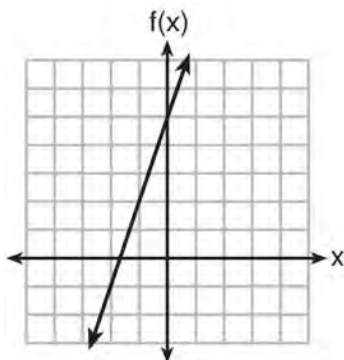
- 1)  $-2$  and  $a$
- 2)  $-2$  and  $-a$
- 3)  $2$  and  $a$
- 4)  $2$  and  $-a$

504 If  $f(x) = x^2$  and  $g(x) = x$ , determine the value(s) of  $x$  that satisfy the equation  $f(x) = g(x)$ .



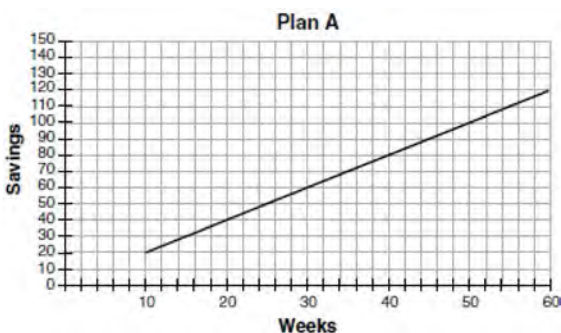
505 Which function has the greatest y-intercept?

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



4)

506 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

507 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)  $4$

508 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*.

509 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)  $a + c = 1470$   
 $7.75a + 10.25c = 150$

510 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.



511 A construction worker needs to move  $120 \text{ ft}^3$  of dirt by using a wheelbarrow. One wheelbarrow load holds  $8 \text{ ft}^3$  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)  $\frac{120 \text{ ft}^3}{1} \cdot \frac{10 \text{ min}}{1 \text{ load}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ load}}{8 \text{ ft}^3}$
- 2)  $\frac{120 \text{ ft}^3}{1} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{8 \text{ ft}^3}{10 \text{ min}} \cdot \frac{1}{1 \text{ load}}$
- 3)  $\frac{120 \text{ ft}^3}{1} \cdot \frac{1 \text{ load}}{10 \text{ min}} \cdot \frac{8 \text{ ft}^3}{1 \text{ load}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$
- 4)  $\frac{120 \text{ ft}^3}{1} \cdot \frac{1 \text{ load}}{8 \text{ ft}^3} \cdot \frac{10 \text{ min}}{1 \text{ load}} \cdot \frac{1 \text{ hr}}{60 \text{ min}}$

512 Solve the equation below for  $x$  in terms of  $a$ .

$$4(ax + 3) - 3ax = 25 + 3a$$

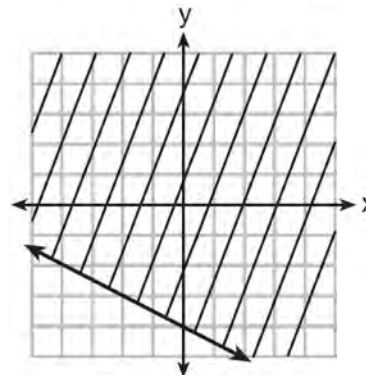
513 For a recently released movie, the function  $y = 119.67(0.61)^x$  models the revenue earned,  $y$ , in millions of dollars each week,  $x$ , for several weeks after its release. Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

- 1) 37.27
- 2) 27.16
- 3) 17.06
- 4) 10.11

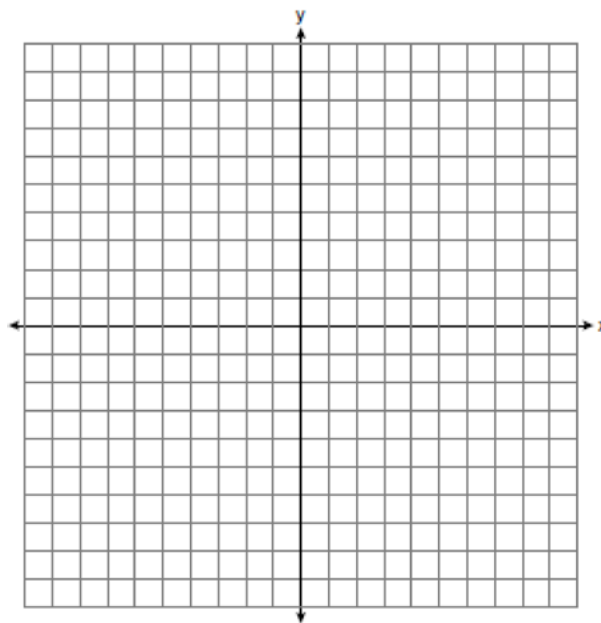
514 Kendal bought  $x$  boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes,  $x$ , Kendal bought?

- 1)  $2x - 12 = 60$
- 2)  $12x - 2 = 60$
- 3)  $12x - 24 = 60$
- 4)  $24 - 12x = 60$

515 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.



516 What is the solution to  $2h + 8 > 3h - 6$ ?

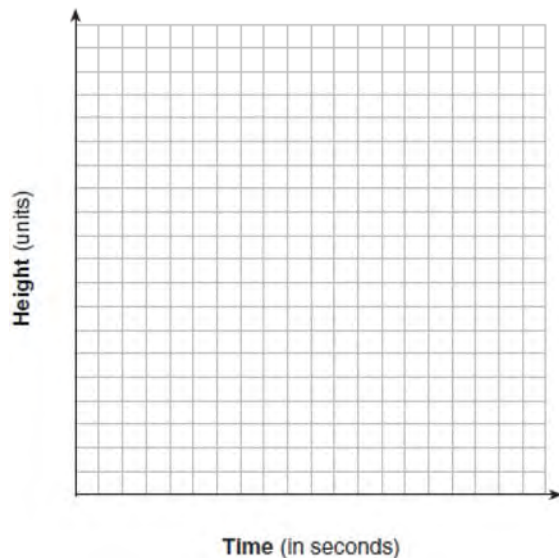
- 1)  $h < 14$
- 2)  $h < \frac{14}{5}$
- 3)  $h > 14$
- 4)  $h > \frac{14}{5}$

517 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)  $(6.0, 5.4)$
- 518 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.

- 519 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
- 520 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.
- 521 Using the quadratic formula, solve  $3x^2 - 2x - 6 = 0$  for all values of  $x$ . Round your answers to the nearest hundredth.
- 522 State whether  $7 - \sqrt{2}$  is rational or irrational. Explain your answer.

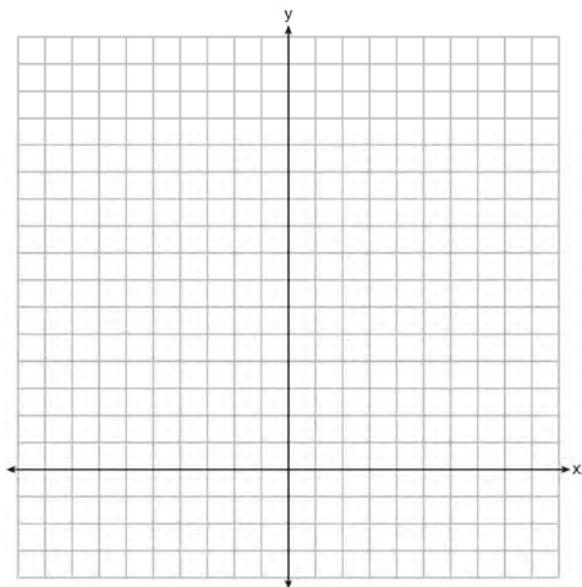
- 523 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

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.

- 524 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.

- 525 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.

- 526 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

- 527 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.

- 528 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
<b>High Temperature, <math>t</math></b>	54	50	62	67	70	58	52	46	48
<b>Coffee Sales, <math>f(t)</math></b>	\$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.

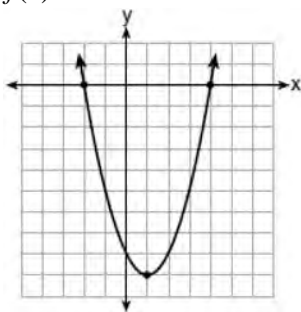
- 529 The table below shows data from a recent car trip for the Burke family.

<b>Hours After Leaving (<math>x</math>)</b>	1	2	3	4	5
<b>Miles from Home (<math>y</math>)</b>	45	112	178	238	305

State the average rate of change for the distance traveled between hours 2 and 4. Include appropriate units.

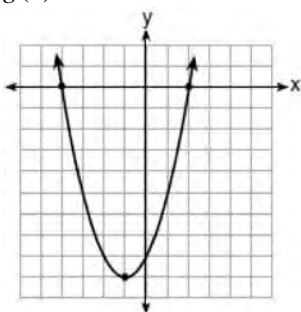
- 530 Which function has zeros of  $-4$  and  $2$ ?

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



2)

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



4)

- 531 Given that  $a > b$ , solve for  $x$  in terms of  $a$  and  $b$ :  
 $b(x - 3) \geq ax + 7b$

- 532 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.

- 533 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  $0 = (B + 3)(B - 1)$

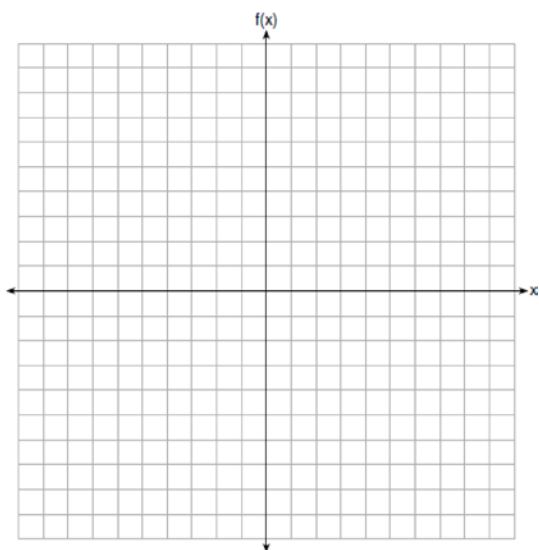
Use Janice's procedure to solve the equation for  $x$ . Explain the method Janice used to solve the quadratic equation.



- 540 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

- 541 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)  $7x^5 + 2x^2 + 6$

- 542 Graph the function  $f(x) = -x^2 - 6x$  on the set of axes below.



State the coordinates of the vertex of the graph.

- 543 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.

- 544 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

- 545 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.

<b>Time (hrs)</b>	0	2	5	7
<b>Distance (mi)</b>	0	140	375	480

Determine the average rate of change between hour 2 and hour 7, including units.

- 546 Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

- 547 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.

- 548 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)  $(4x + 6)(4x + 6)$

- 549 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.

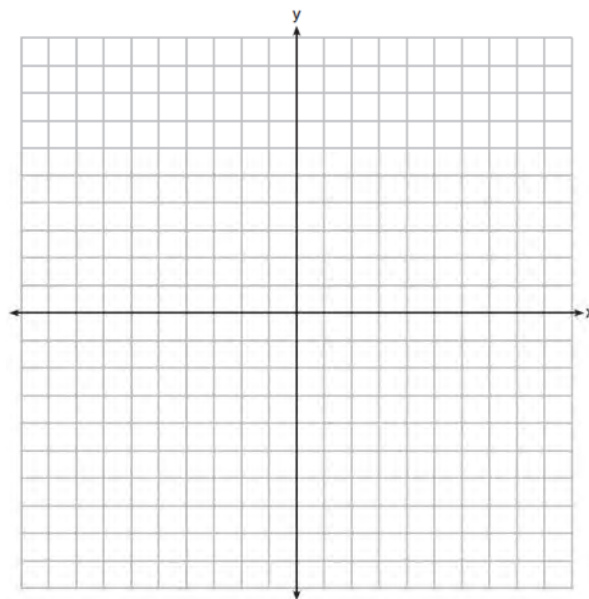
- 550 Solve the equation  $x^2 - 6x = 15$  by completing the square.

- 551 On the set of axes below, graph

$$g(x) = \frac{1}{2}x + 1$$

and

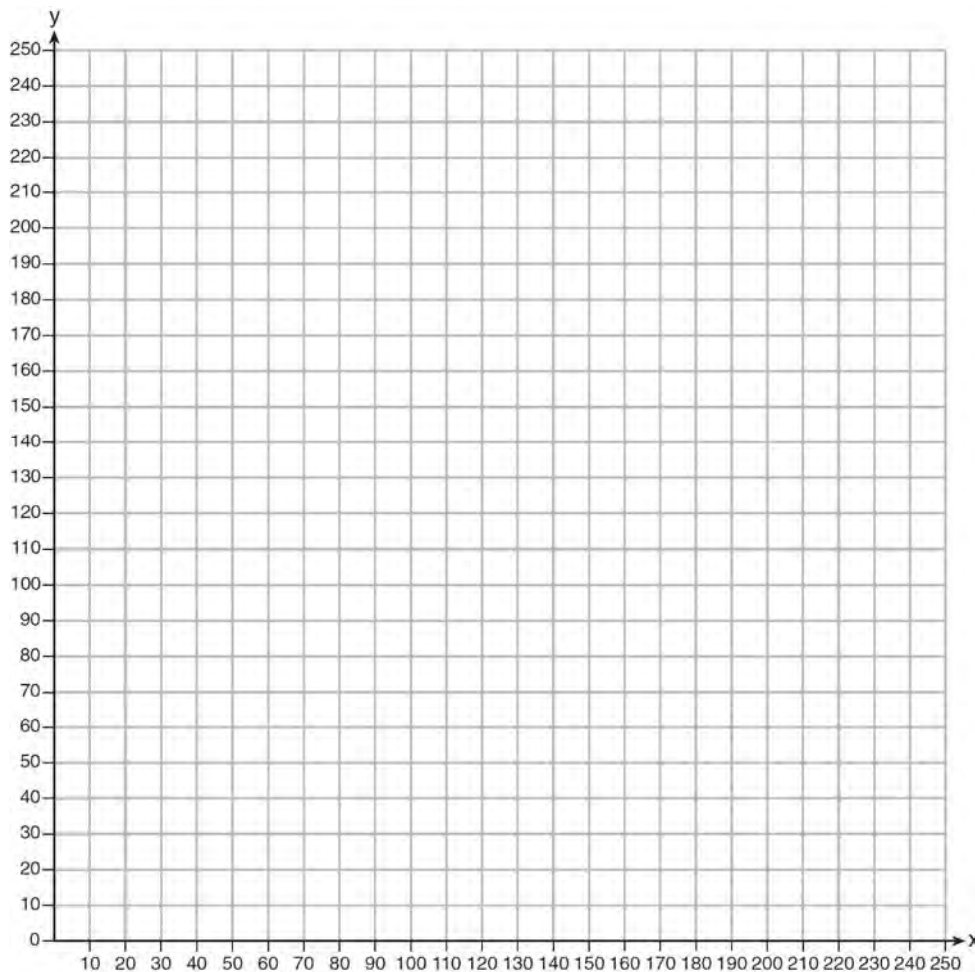
$$f(x) = \begin{cases} 2x + 1, & x \leq -1 \\ 2 - x^2, & x > -1 \end{cases}$$



How many values of  $x$  satisfy the equation  $f(x) = g(x)$ ? Explain your answer, using evidence from your graphs.

- 552 Given that  $f(x) = 2x + 1$ , find  $g(x)$  if  $g(x) = 2[f(x)]^2 - 1$ .

- 553 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.



- 554 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  $-1$
- 555 Find the zeros of  $f(x) = (x - 3)^2 - 49$ , algebraically.
- 556 State whether  $2\sqrt{3} + 6$  is rational or irrational. Explain your answer.

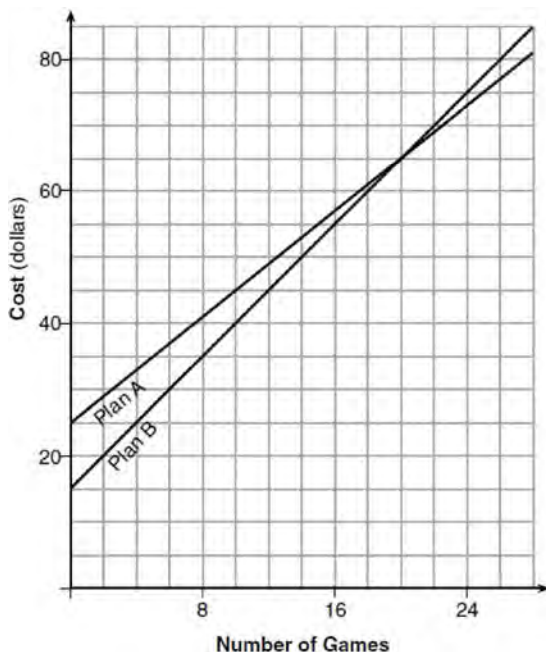


- 557 Tanya is making homemade greeting cards. The data table below represents the amount she spends in dollars,  $f(x)$ , in terms of the number of cards she makes,  $x$ .

$x$	$f(x)$
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.

- 558 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.

- 559 When the temperature is  $59^{\circ}\text{F}$ , the speed of sound at sea level is 1225 kilometers per hour. Which process could be used to convert this speed into feet per second?

- 1)  $\frac{1225 \text{ km}}{1 \text{ hr}} \cdot \frac{0.62 \text{ mi}}{1 \text{ km}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{1 \text{ min}}{60 \text{ sec}}$
- 2)  $\frac{1225 \text{ km}}{1 \text{ hr}} \cdot \frac{0.62 \text{ mi}}{1 \text{ km}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}}$
- 3)  $\frac{1225 \text{ km}}{1 \text{ hr}} \cdot \frac{1 \text{ km}}{0.62 \text{ mi}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}}$
- 4)  $\frac{1225 \text{ km}}{1 \text{ hr}} \cdot \frac{0.62 \text{ mi}}{1 \text{ km}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} \cdot \frac{1 \text{ min}}{60 \text{ sec}}$

- 560 What are the solutions to the equation

$$3x^2 + 10x = 8?$$

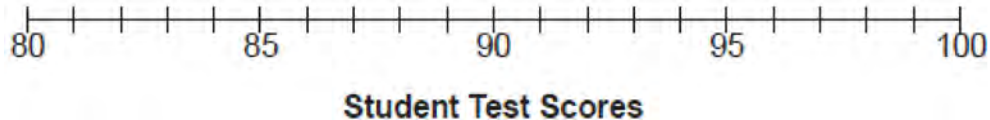
- 1)  $\frac{2}{3}$  and  $-4$
- 2)  $-\frac{2}{3}$  and  $4$
- 3)  $\frac{4}{3}$  and  $-2$
- 4)  $-\frac{4}{3}$  and  $2$

- 561 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  $r(x)$ .

562 Student scores on a recent test are shown in the table below.

85	96	92	82	90
90	88	95	85	88
90	87	96	82	85
92	96	85	92	87

On the number line below, create a dot plot to model the data.



State the median test score for the data set.

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

<b>Time, <math>m</math> (minutes)</b>	0	2	4	6	8
<b>Temperature, <math>T(m)</math> (<math>^{\circ}</math>F)</b>	150	108	78	56	41

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

- 1)  $150(0.85)^m$                       3)  $150(0.85)^{m-1}$   
 2)  $150(1.15)^m$                       4)  $150(1.15)^{m-1}$

564 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

566 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)  $-4 \pm \sqrt{26}$

565 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

567 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.

568 The function,  $t(x)$ , is shown in the table below.

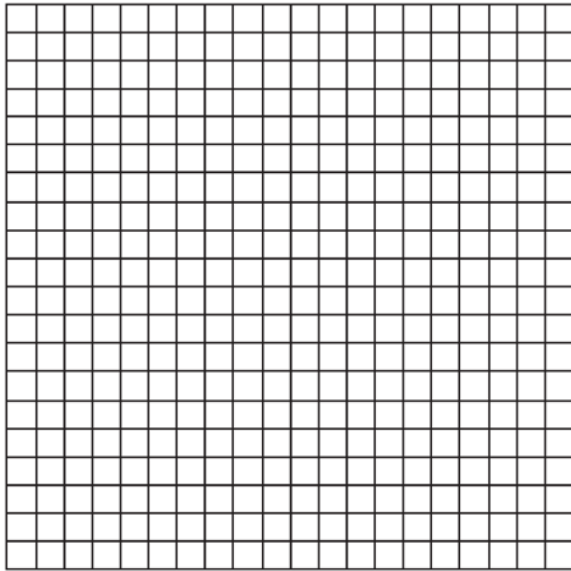
$x$	$t(x)$
-3	10
-1	7.5
1	5
3	2.5
5	0

Determine whether  $t(x)$  is linear or exponential. Explain your answer.

569 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.

570 Describe the effect that each transformation below has on the function  $f(x) = |x|$ , where  $a > 0$ .

$$g(x) = |x - a|$$

$$h(x) = |x| - a$$

571 Is the sum of  $3\sqrt{2}$  and  $4\sqrt{2}$  rational or irrational? Explain your answer.

572 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.

573 What is the solution to the system of equations below?

$$y = 2x + 8$$

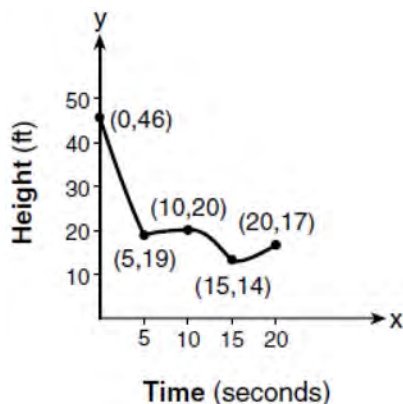
$$3(-2x + y) = 12$$

- 1) no solution
- 2) infinite solutions
- 3)  $(-1, 6)$
- 4)  $\left(\frac{1}{2}, 9\right)$

574 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.

575 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

576 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)  $x \geq 11$

577 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.

578 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)  $y = (x - 6)^2 - 2$

579 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.

580 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?

581 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)  $k(x) = 1.5x^3 + 1.5x^2$

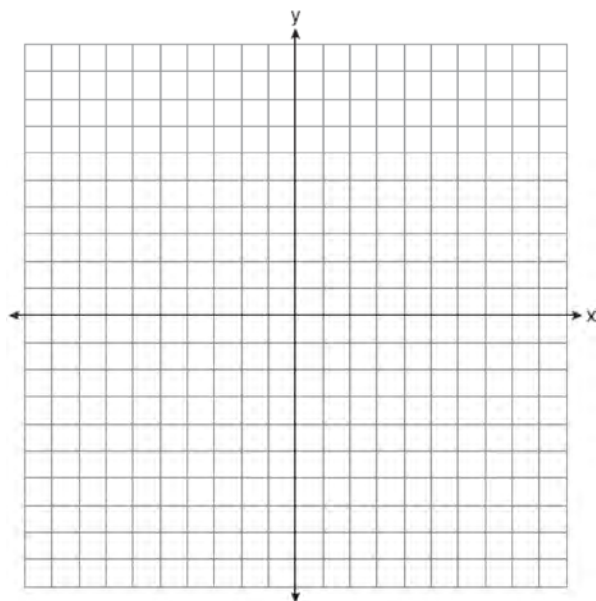
582 The table below shows the year and the number of households in a building that had high-speed broadband internet access.

<b>Number of Households</b>	11	16	23	33	42	47
<b>Year</b>	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
- 583 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)  $(x - 8)^2 = 23$
- 584 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)  $C(t) = 240(1.986)^{\frac{t}{24}}$
- 585 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)  $(8x^2 + 32)(8x^2 - 32)$
- 586 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)  $A = 1000(1 + 1.3)^2$
- 587 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
- 588 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  $S$ .

- 589 On the set of axes below, draw the graph of  $y = x^2 - 4x - 1$ .



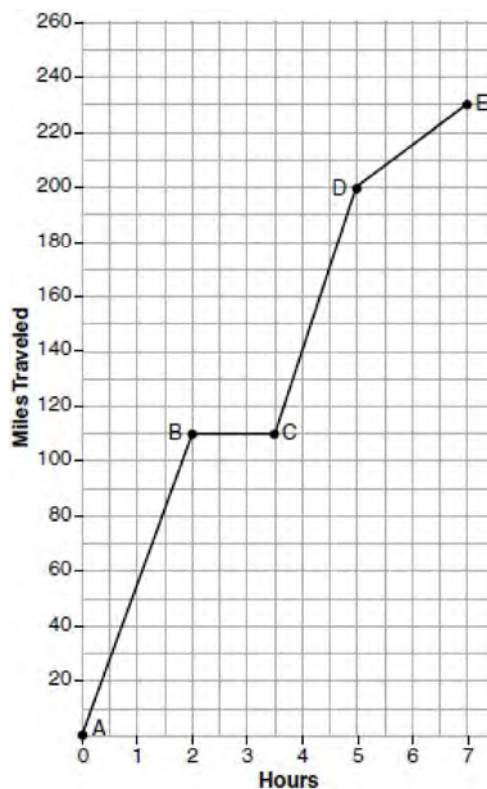
State the equation of the axis of symmetry.

- 590 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.

- 591 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)  $8x^3 + 2x^2 + 3x + 18$

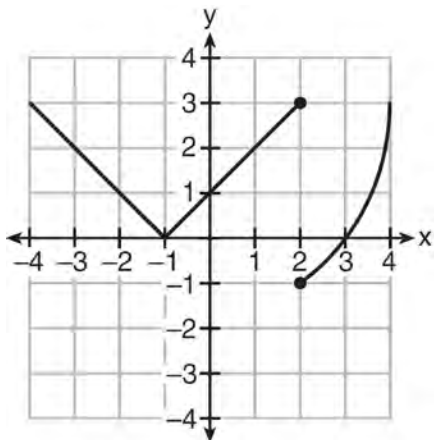
- 592 Which situation does *not* describe a causal relationship?
- 1) The higher the volume on a radio, the louder the sound will be.
  - 2) The faster a student types a research paper, the more pages the paper will have.
  - 3) The shorter the distance driven, the less gasoline that will be used.
  - 4) The slower the pace of a runner, the longer it will take the runner to finish the race.

- 593 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.

- 594 Marcel claims that the graph below represents a function.



State whether Marcel is correct. Justify your answer.

- 595 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)  $k(n) = 6(8)^{2n}$

- 596 What is the solution to the inequality

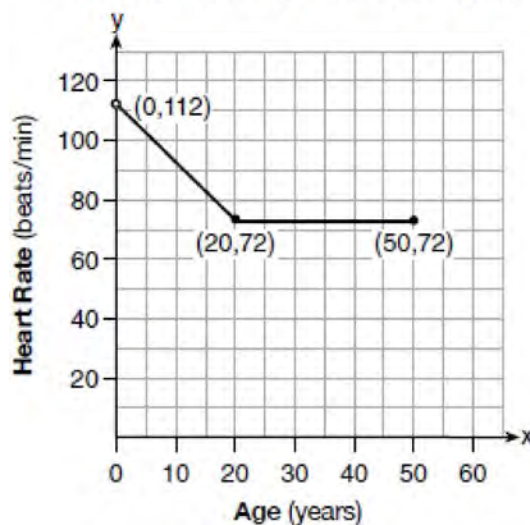
$$2 + \frac{4}{9}x \geq 4 + x?$$

- 1)  $x \leq -\frac{18}{5}$
- 2)  $x \geq -\frac{18}{5}$
- 3)  $x \leq \frac{54}{5}$
- 4)  $x \geq \frac{54}{5}$

- 597 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.

- 598 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.

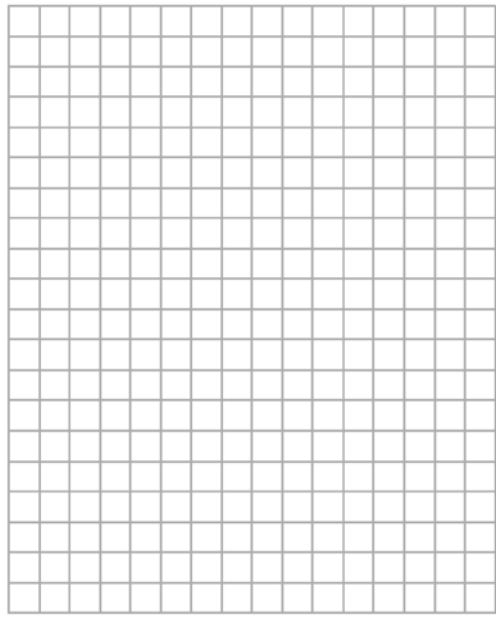
599 The heights, in feet, of former New York Knicks basketball players are listed below.

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.

600 When  $(2x - 3)^2$  is subtracted from  $5x^2$ , the result is

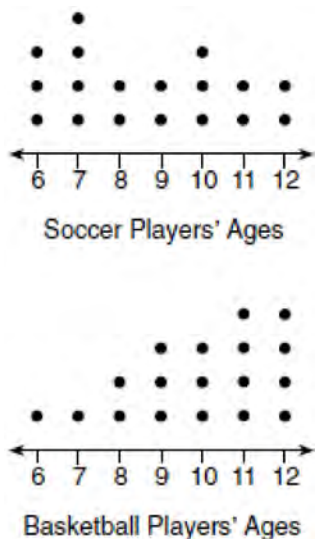
- 1)  $x^2 - 12x - 9$
- 2)  $x^2 - 12x + 9$
- 3)  $x^2 + 12x - 9$
- 4)  $x^2 + 12x + 9$

601 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



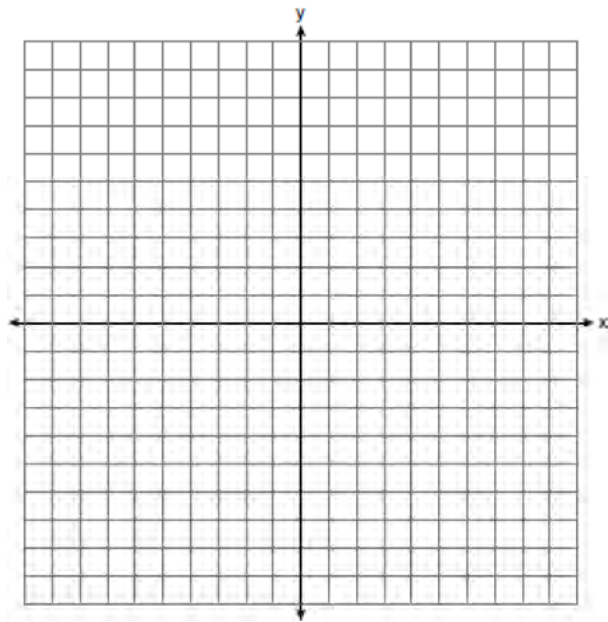
- 602 Noah conducted a survey on sports participation. He created the following two dot plots to represent the number of students participating, by age, in soccer and basketball.



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.
- 603 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.

- 604 Graph the inequality  $y + 4 < -2(x - 4)$  on the set of axes below.



- 605 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
- 606 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)  $2(9x + 25)(9x - 25)$
- 607 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.

- 608 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.

- 609 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

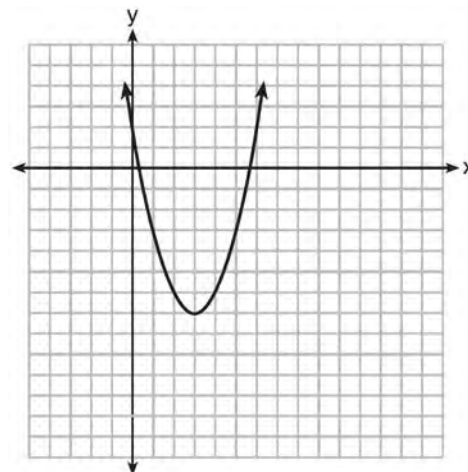
- 610 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over  $t$  weeks can be defined by the function  $f(t) = (8) \cdot 2^t$ . Jessica finds that the growth function over  $t$  weeks is  $g(t) = 2^{t+3}$ . Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks. Based on the growth from both functions, explain the relationship between  $f(t)$  and  $g(t)$ .

- 611 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

- 612 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.

- 613 The graph representing a function is shown below.



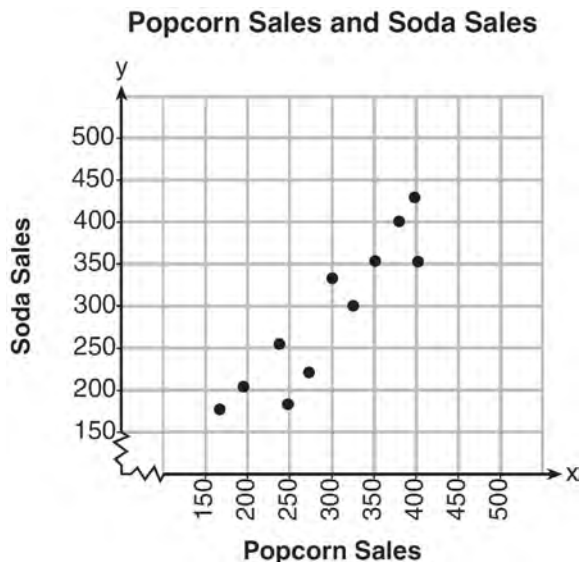
Which function has a minimum that is *less* than the one shown in the graph?

- 1)  $y = x^2 - 6x + 7$
- 2)  $y = |x + 3| - 6$
- 3)  $y = x^2 - 2x - 10$
- 4)  $y = |x - 8| + 2$

614 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			

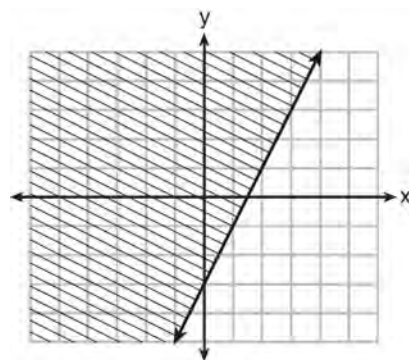
615 The scatterplot below compares the number of bags of popcorn and the number of sodas sold at each performance of the circus over one week.



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.

616 Which inequality is represented by the graph below?

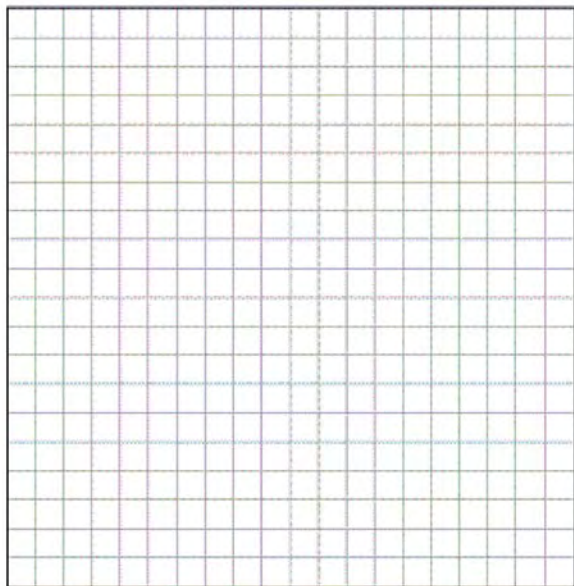


- 1)  $y \leq 2x - 3$
- 2)  $y \geq 2x - 3$
- 3)  $y \leq -3x + 2$
- 4)  $y \geq -3x + 2$

617 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

618 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.

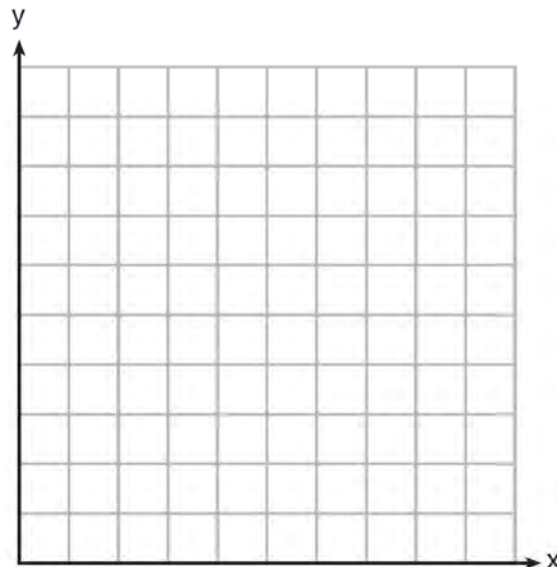


Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

619 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

620 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.

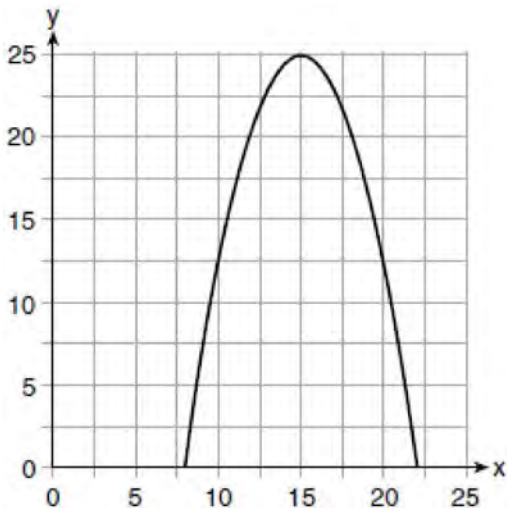
621 The graphs of the functions  $f(x) = |x - 3| + 1$  and  $g(x) = 2x + 1$  are drawn. Which statement about these functions is true?

- 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  $x = 3$ .

- 622 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

- 623 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

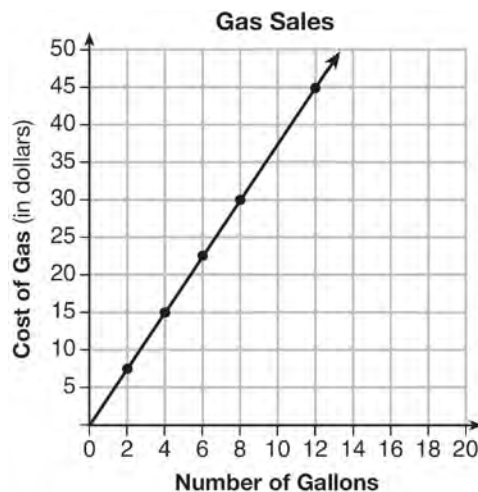
- 624 The graph of a quadratic function is shown below.



An equation that represents the function could be

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

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



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.

- 626 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

- 627 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)  $2x^2 + 7x - 11$

628 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  $-2$

629 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)  $(x - 3)^2 = -3$

630 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)  $x(x - 2)(x + 15)$

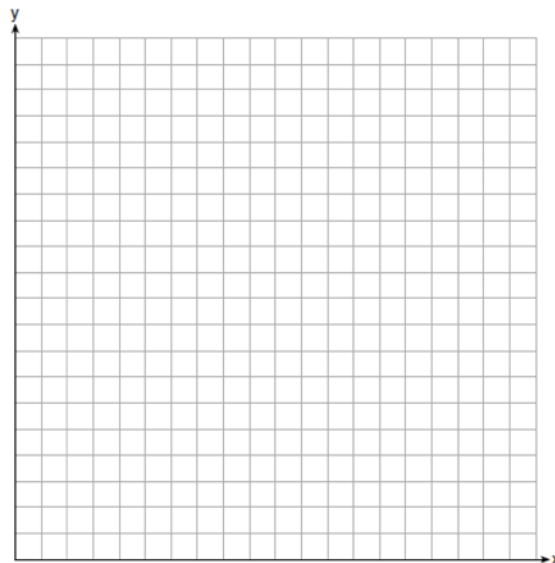
631 What type of relationship exists between the number of pages printed on a printer and the amount of ink used by that printer?

- 1) positive correlation, but not causal
- 2) positive correlation, and causal
- 3) negative correlation, but not causal
- 4) negative correlation, and causal

632 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)  $(x^2 - 4)(x^2 - 4)$


633 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.

634 The zeros of a polynomial function are  $-2$ ,  $4$ , and  $0$ . What are all the factors of this function?

- 1)  $(x + 2)$  and  $(x - 4)$
- 2)  $(x - 2)$  and  $(x + 4)$
- 3)  $x$ ,  $(x + 2)$ , and  $(x - 4)$
- 4)  $x$ ,  $(x - 2)$ , and  $(x + 4)$

- 635 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)  $500 + 500(.04) + 520(.04) + 540.8(.04)$
- 636 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.
- 637 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.
- 638 The range of the function defined as  $y = 5^x$  is
- 1)  $y < 0$
  - 2)  $y > 0$
  - 3)  $y \leq 0$
  - 4)  $y \geq 0$
- 639 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)  $f(x) = 3(x + 2)^2 + 7$
- 640 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)  $2lh$
- 641 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)  $280 - 30(w - 1)$
- 642 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.

643 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

<b>Median Diameter of Grains of Sand, in Millimeters (<math>x</math>)</b>	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
<b>Slope of Beach, in Degrees (<math>y</math>)</b>	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.

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

<b>Overall Student Average</b>	92	98	84	80	75	82
<b>Math Class Average</b>	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  $0.5$ .

645 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?

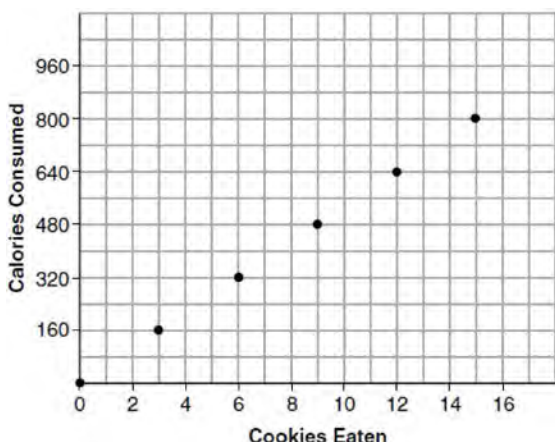
- 1)  $m + g \leq 40$   
 $12m + 14g \geq 250$
- 2)  $m + g \geq 40$   
 $12m + 14g \leq 250$
- 3)  $m + g \leq 40$   
 $12m + 14g \leq 250$
- 4)  $m + g \geq 40$   
 $12m + 14g \geq 250$

646 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)  $40x + 30y = 100$   
 $36x + 30y = -96$

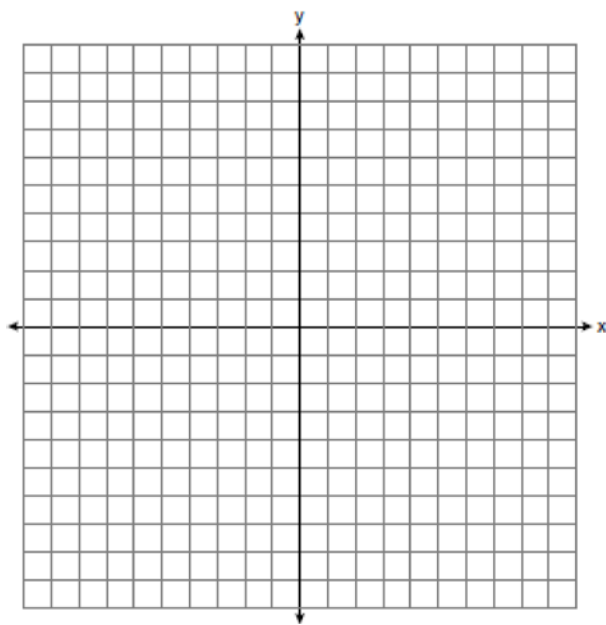


- 647 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

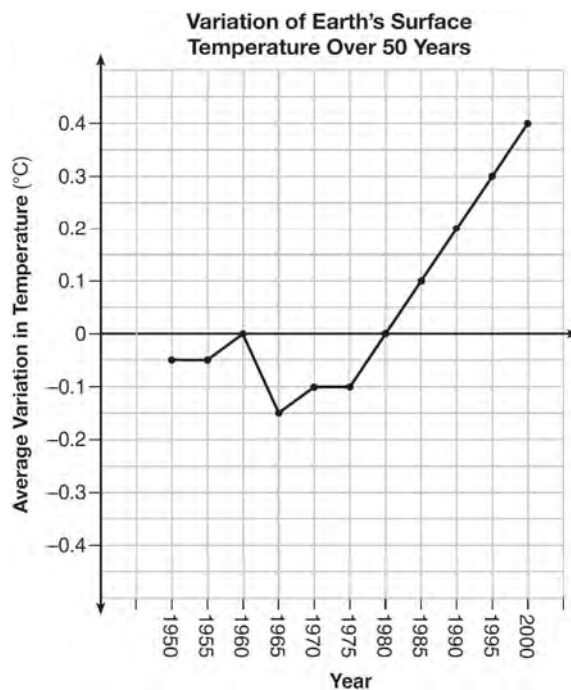
- 648 Graph the inequality  $y > 2x - 5$  on the set of axes below. State the coordinates of a point in its solution.



- 649 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)  $0 \leq t \leq 1.5$
- 2)  $0 \leq t \leq 9$
- 3)  $0 \leq h(t) \leq 1.5$
- 4)  $0 \leq h(t) \leq 9$

- 650 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.

- 651 Solve the inequality below:  
 $1.8 - 0.4y \geq 2.2 - 2y$

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

<b>Time (sec)</b>	0	1	2	3	4	5	6	7
<b>Height (ft)</b>	180	260	308	324	308	260	180	68

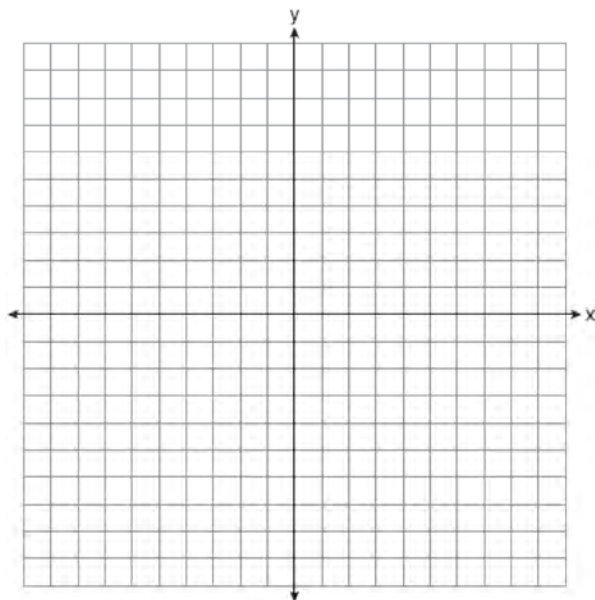
Based on these data, which statement is *not* a valid conclusion?

- 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.

653 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

654 On the set of axes below, graph the equation  $3y + 2x = 15$ .



Explain why  $(-6, 9)$  is a solution to the equation.

655 The expression  $49x^2 - 36$  is equivalent to

- 1)  $(7x - 6)^2$
- 2)  $(24.5x - 18)^2$
- 3)  $(7x - 6)(7x + 6)$
- 4)  $(24.5x - 18)(24.5x + 18)$

656 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

657 What is the *minimum* value of the function

$$y = |x + 3| - 2?$$

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

658 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

659 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

660 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

- 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.

661 A system of equations is given below.

$$x + 2y = 5$$

$$2x + y = 4$$

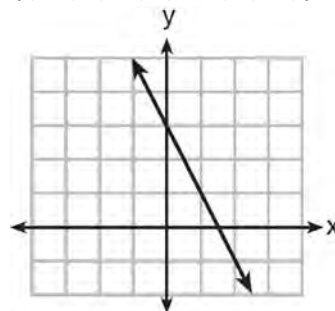
Which system of equations does *not* have the same solution?

- 1)  $3x + 6y = 15$   
 $2x + y = 4$
- 2)  $4x + 8y = 20$   
 $2x + y = 4$
- 3)  $x + 2y = 5$   
 $6x + 3y = 12$
- 4)  $x + 2y = 5$   
 $4x + 2y = 12$

662 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)  $2y = -6x + 10$

663 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.

664 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.

665 Determine if the product of  $3\sqrt{2}$  and  $8\sqrt{18}$  is rational or irrational. Explain your answer.

666 Which point is a solution to the system below?

$$2y < -12x + 4$$

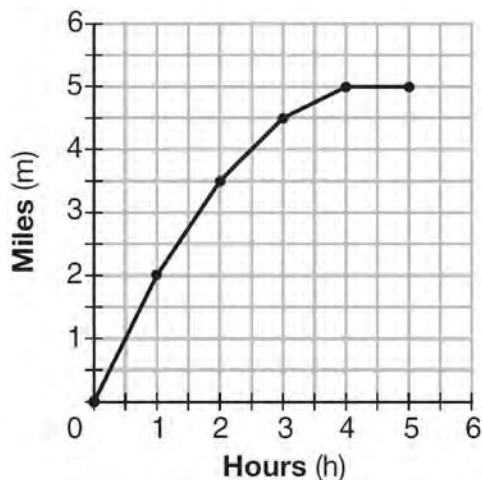
$$y < -6x + 4$$

- 1)  $\left(1, \frac{1}{2}\right)$
- 2)  $(0, 6)$
- 3)  $\left(-\frac{1}{2}, 5\right)$
- 4)  $(-3, 2)$

667 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

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



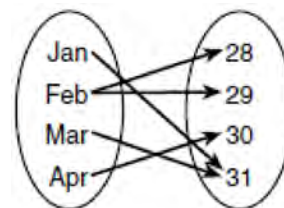
Which hourly interval had the greatest rate of change?

- 1) hour 0 to hour 1
- 2) hour 1 to hour 2
- 3) hour 2 to hour 3
- 4) hour 3 to hour 4

669 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)  $\frac{V_2}{P_1 V_1}$
- 3)  $\frac{P_1 V_1}{V_2}$
- 4)  $\frac{P_1 V_2}{V_1}$

670 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

671 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.

672 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.

673 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

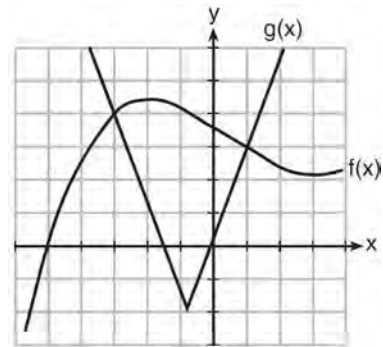
Which linear equation can be used to find  $x$ , the additional hourly parking rate?

- 1)  $9.00 + 3x = 20.00$
- 2)  $9.00 + 3.50x = 20.00$
- 3)  $2x + 3.50 = 14.50$
- 4)  $2x + 9.00 = 14.50$

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

- 1)  $\frac{36}{25}$
- 2)  $\frac{25}{36}$
- 3)  $-\frac{6}{5}$
- 4)  $-\frac{5}{6}$

676 The graph below shows two functions,  $f(x)$  and  $g(x)$ . State all the values of  $x$  for which  $f(x) = g(x)$ .



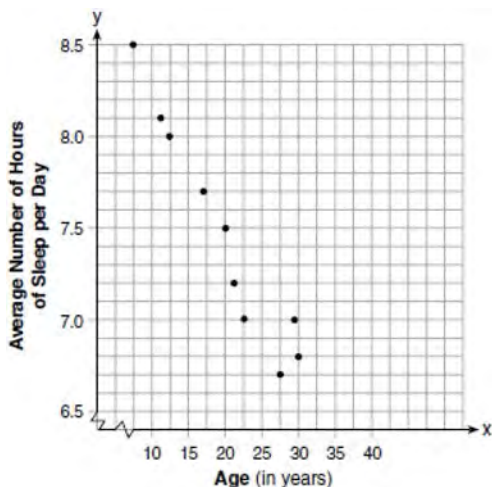
675 Express in simplest form:  
 $(3x^2 + 4x - 8) - (-2x^2 + 4x + 2)$

- 677 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  $\pm 4$ . Who is correct?
- 1) Lynn, only
  - 2) Jude, only
  - 3) Anne, only
  - 4) Both Lynn and Jude
- 678 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.
- 679 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
- 680 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)  $p(t) = 100t + 3$
- 681 Which expression is equivalent to  $2(3g - 4) - (8g + 3)$ ?
- 1)  $-2g - 1$
  - 2)  $-2g - 5$
  - 3)  $-2g - 7$
  - 4)  $-2g - 11$
- 682 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
- 683 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
- 684 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.

685 The formula for blood flow rate is given by  $F = \frac{p_1 - p_2}{r}$ , 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)  $r = \frac{p_1 - p_2}{F}$

686 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.

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

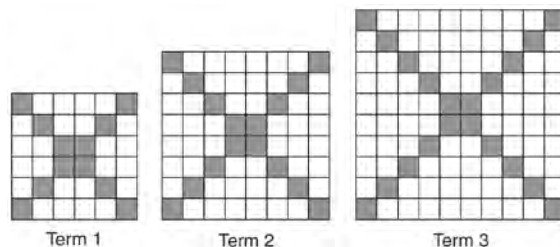
- 1) -13
- 2) -10
- 3) 10
- 4) 11

688 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.

689 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)  $f(x) = x(x - 3)(x + 4)$

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



Assuming the pattern continues, which formula determines  $a_n$ , the number of shaded squares in the  $n$ th term?

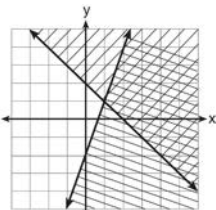
- 1)  $a_n = 4n + 12$
- 2)  $a_n = 4n + 8$
- 3)  $a_n = 4n + 4$
- 4)  $a_n = 4n + 2$

**Algebra I Regents at Random Worksheets**

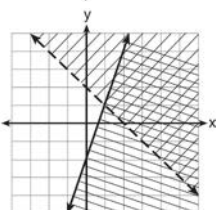
691 Given:  $y + x > 2$

$$y \leq 3x - 2$$

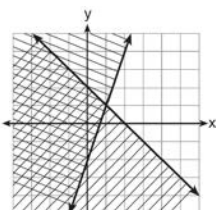
Which graph shows the solution of the given set of inequalities?



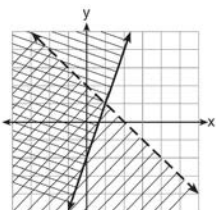
1)



2)



3)



4)

692 For which value of  $P$  and  $W$  is  $P + W$  a rational number?

1)  $P = \frac{1}{\sqrt{3}}$  and  $W = \frac{1}{\sqrt{6}}$

2)  $P = \frac{1}{\sqrt{4}}$  and  $W = \frac{1}{\sqrt{9}}$

3)  $P = \frac{1}{\sqrt{6}}$  and  $W = \frac{1}{\sqrt{10}}$

4)  $P = \frac{1}{\sqrt{25}}$  and  $W = \frac{1}{\sqrt{2}}$

693 When solving the equation  $4(3x^2 + 2) - 9 = 8x^2 + 7$ ,

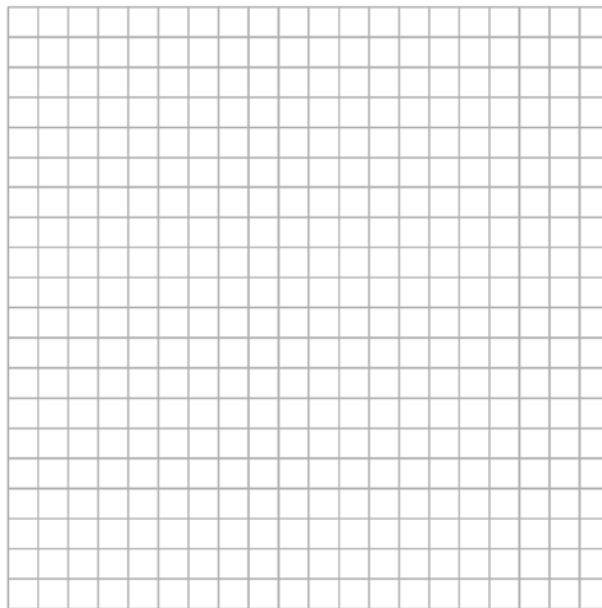
Emily wrote  $4(3x^2 + 2) = 8x^2 + 16$  as her first step.

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

694 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.

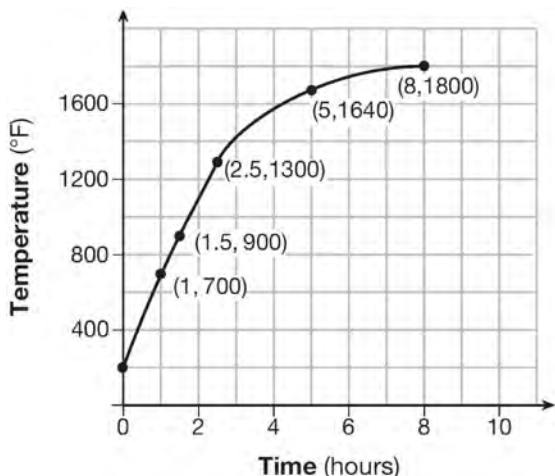
a) On the grid below, draw and label a graph that models the accumulation of snow over time using the data the meteorologist collected.



b) If the snowstorm started at 6 p.m., how much snow had accumulated by midnight?



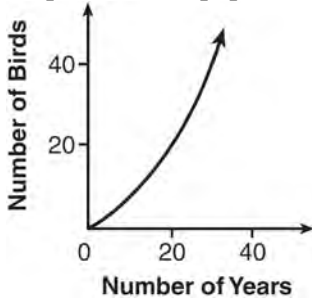
- 695 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to  $200^{\circ}\text{F}$ .



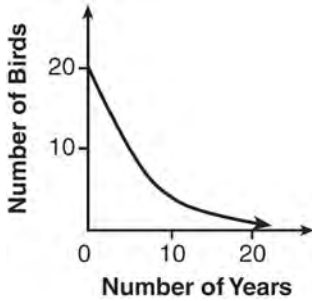
During which time interval did the temperature in the kiln show the greatest average rate of change?

- 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
- 696 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.
- $$w(x) = \begin{cases} 10x, & 0 \leq x \leq 40 \\ 15(x - 40) + 400, & x > 40 \end{cases}$$
- 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.
- 697 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*.
- 698 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
- 699 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)  $-2 \pm 4\sqrt{5}$
- 700 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
- 701 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)  $a_n = 16n - 38$

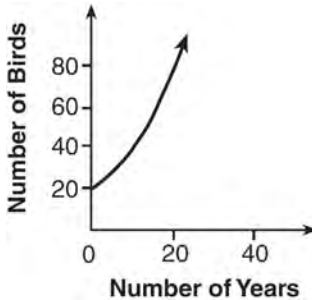
702 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?



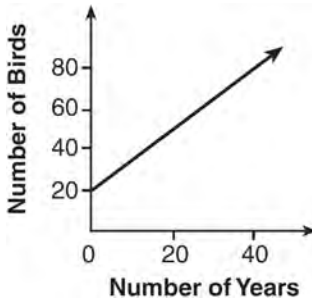
1)



2)



3)



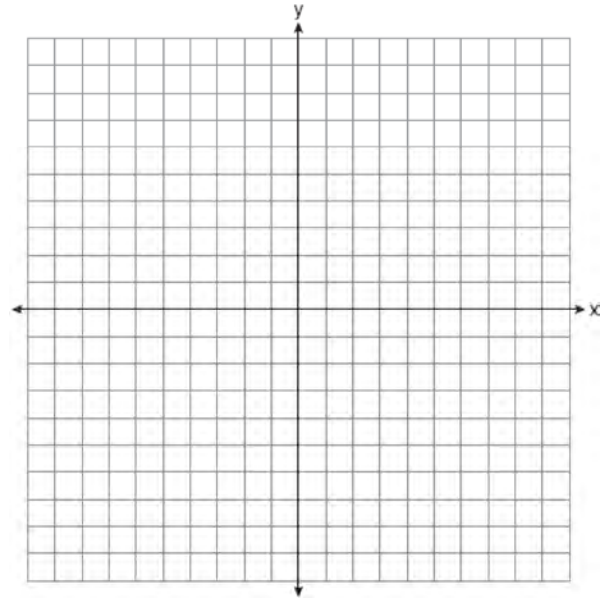
4)

703 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.

704 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

705 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.]



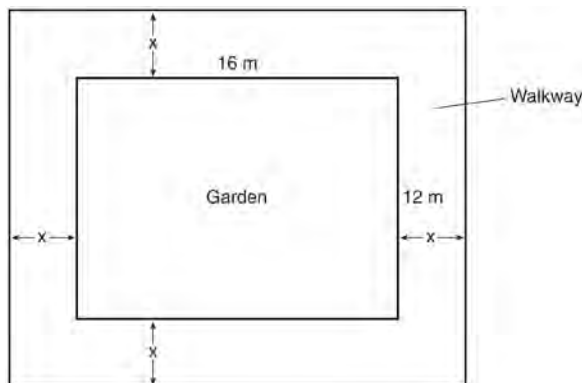
706 Last week, a candle store received \$355.60 for selling 20 candles. Small candles sell for \$10.98 and large candles sell for \$27.98. How many large candles did the store sell?

- 1) 6
- 2) 8
- 3) 10
- 4) 12

707 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)  $x^2 + 8^2 = (x + 2)^2$

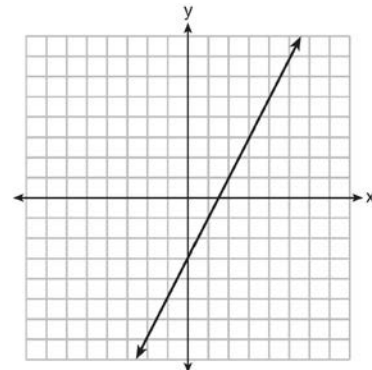
708 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of  $x$  meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



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.

709 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.

710 Which function has the same y-intercept as the graph below?



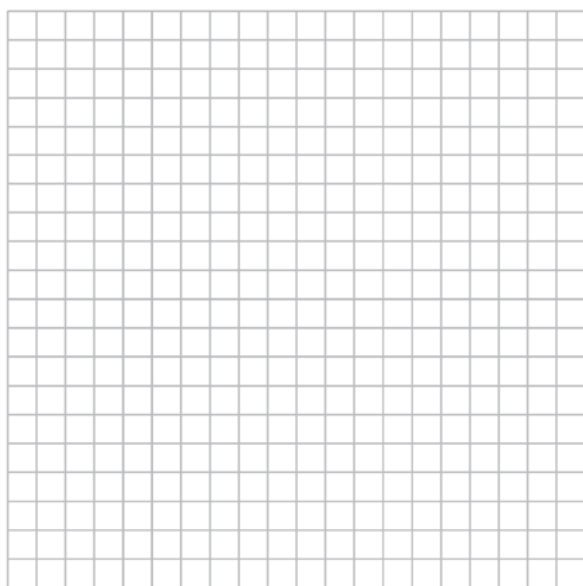
- 1)  $y = \frac{12 - 6x}{4}$
- 2)  $27 + 3y = 6x$
- 3)  $6y + x = 18$
- 4)  $y + 3 = 6x$

711 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.

712 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.

713 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.



714 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.

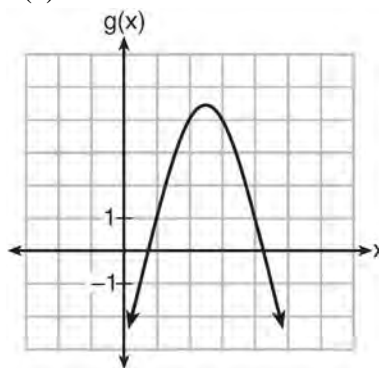
715 Which quadratic function has the largest maximum?

1)  $h(x) = (3 - x)(2 + x)$

x	f(x)
-1	-3
0	5
1	9
2	9
3	5
4	-3

2)

3)  $k(x) = -5x^2 - 12x + 4$



4)

716 The formula for the volume of a cone is

$V = \frac{1}{3} \pi r^2 h$ . The radius,  $r$ , of the cone may be expressed as

- 1)  $\sqrt{\frac{3V}{\pi h}}$
- 2)  $\sqrt{\frac{V}{3\pi h}}$
- 3)  $3\sqrt{\frac{V}{\pi h}}$
- 4)  $\frac{1}{3} \sqrt{\frac{V}{\pi h}}$

717 Subtract  $5x^2 + 2x - 11$  from  $3x^2 + 8x - 7$ . Express the result as a trinomial.

- 718 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.
- 719 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)  $6x + 6y = 48$   
 $6x + 2y = 8$
- 720 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.
- 721 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
- 722 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)
- 723 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)
- 724 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*.

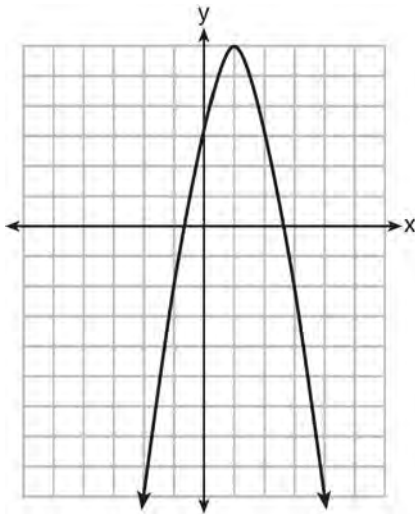
725 The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

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

726 Let  $f$  be the function represented by the graph below.

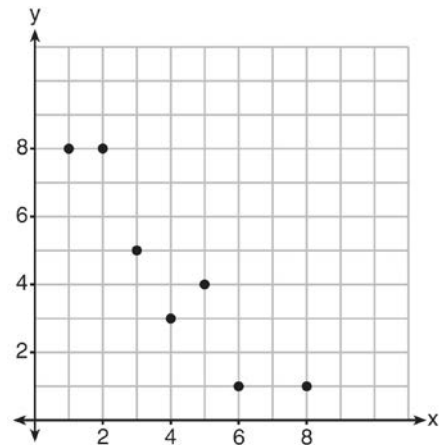


Let  $g$  be a function such that  $g(x) = -\frac{1}{2}x^2 + 4x + 3$ .

Determine which function has the larger maximum value. Justify your answer.

727 Write an equation that defines  $m(x)$  as a trinomial where  $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$ . Solve for  $x$  when  $m(x) = 0$ .

728 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

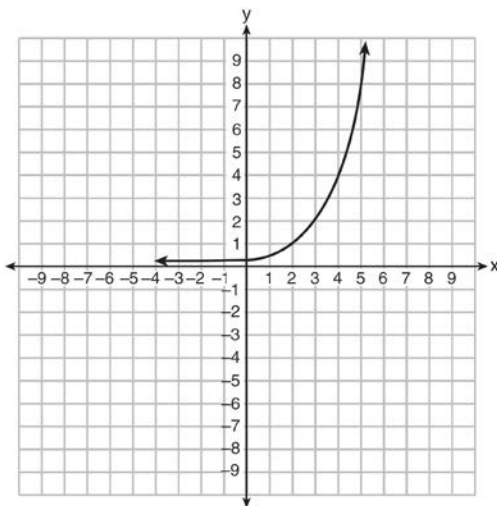
729 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	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.



730 Write an exponential equation for the graph shown below.

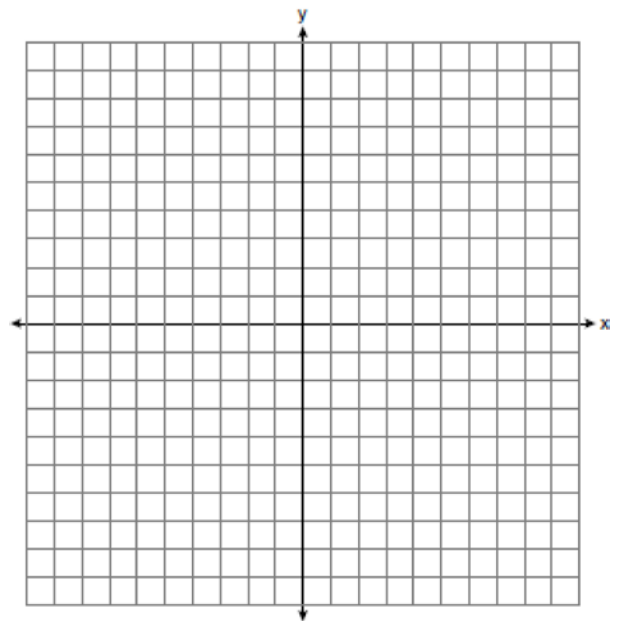


Explain how you determined the equation.

731 The inequality  $7 - \frac{2}{3}x < x - 8$  is equivalent to

- 1)  $x > 9$
- 2)  $x > -\frac{3}{5}$
- 3)  $x < 9$
- 4)  $x < -\frac{3}{5}$

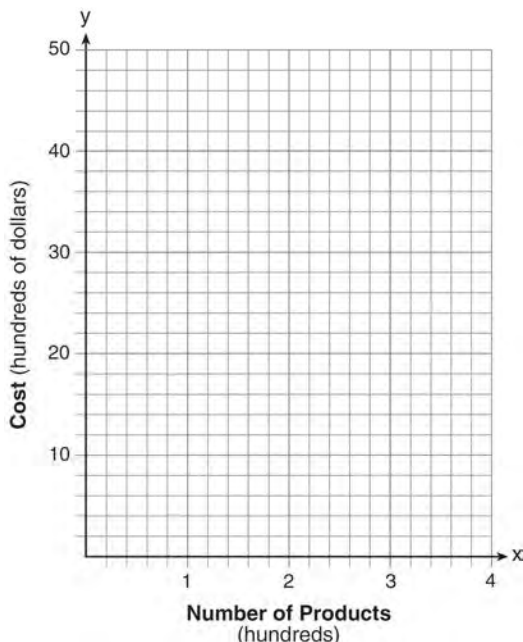
732 On the set of axes below, graph the function  $y = |x + 1|$ .



State the range of the function. State the domain over which the function is increasing.

733 Use the method of completing the square to determine the exact values of  $x$  for the equation  $x^2 + 6x - 41 = 0$ . Express your answer in simplest radical form.

- 734 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.

- 735 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)  $(2x + 3)(x - 1) = 0$

- 736 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.

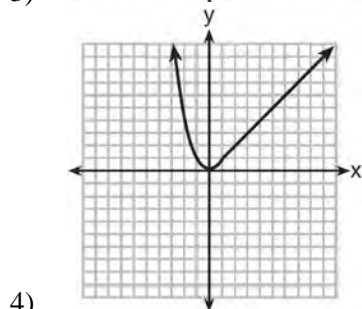
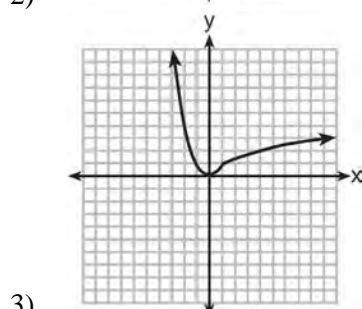
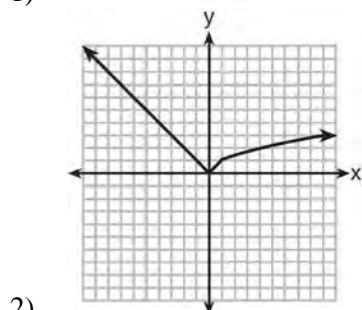
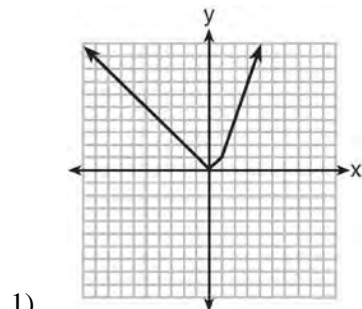
- 737 A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of \$62 and an overage charge of \$30 per gigabyte of data that exceed 2 gigabytes. If  $C$  represents the cost and  $g$  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)  $C = 62 + 30(g - 2)$

- 738 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)  $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

- 739 How many real solutions does the equation  $x^2 - 2x + 5 = 0$  have? Justify your answer.



740 Which graph represents  $f(x) = \begin{cases} |x| & x < 1 \\ \sqrt{x} & x \geq 1 \end{cases}$  ?

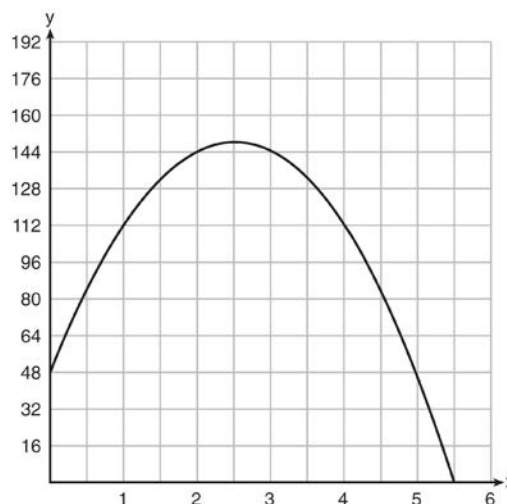


741 If the difference  $(3x^2 - 2x + 5) - (x^2 + 3x - 2)$  is multiplied by  $\frac{1}{2}x^2$ , what is the result, written in standard form?

742 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.

743 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.

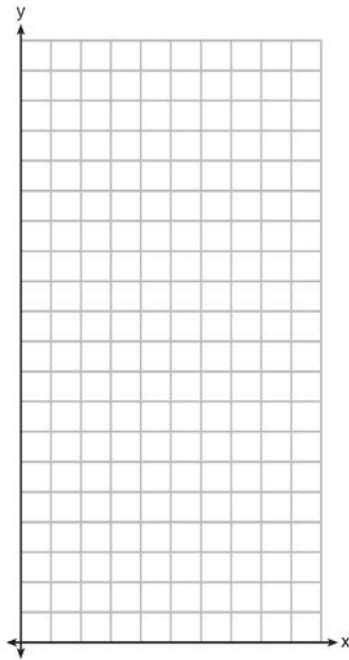


For which interval is the ball's height always decreasing?

- 1)  $0 \leq x \leq 2.5$
- 2)  $0 < x < 5.5$
- 3)  $2.5 < x < 5.5$
- 4)  $x \geq 2$

744 Solve the equation  $4x^2 - 12x = 7$  algebraically for  $x$ .

745 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.

746 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)  $(p + 3)(p - 3)(p + 3)(p - 3)$

747 Keith determines the zeros of the function  $f(x)$  to be  $-6$  and  $5$ . What could be Keith's function?

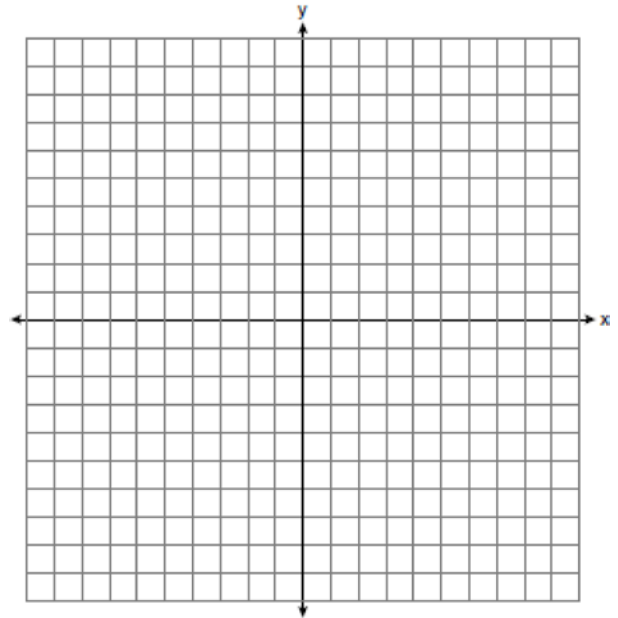
- 1)  $f(x) = (x + 5)(x + 6)$
- 2)  $f(x) = (x + 5)(x - 6)$
- 3)  $f(x) = (x - 5)(x + 6)$
- 4)  $f(x) = (x - 5)(x - 6)$

748 Factor  $36 - 4x^2$  completely.

749 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

750 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  $f(x) = g(x)$ .

751 Determine the smallest integer that makes  $-3x + 7 - 5x < 15$  true.

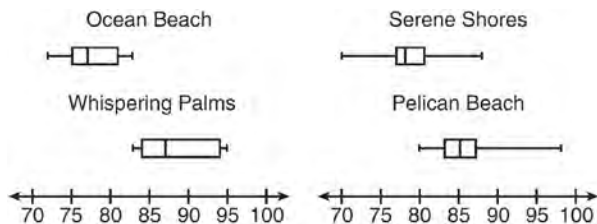
752 The table below shows the average diameter of a pupil in a person’s eye as he or she grows older.

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

753 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.



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

754 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.

755 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.

756 Which table represents a function?

- 1) 

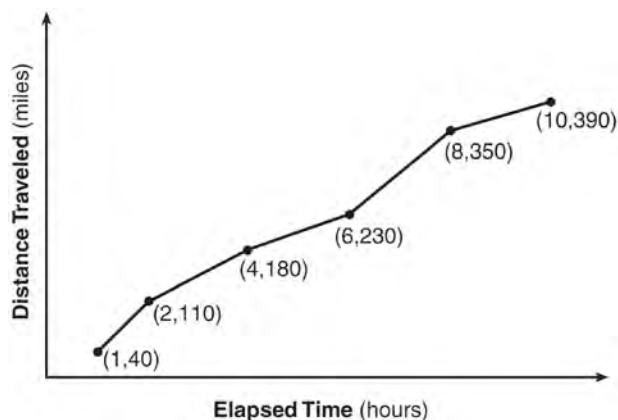
x	2	4	2	4
f(x)	3	5	7	9
- 2) 

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

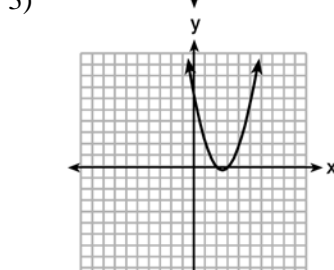
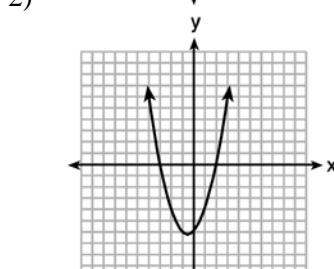
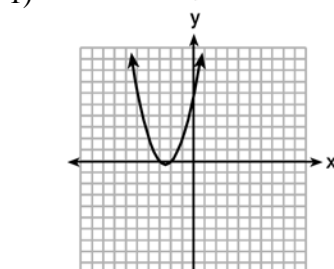
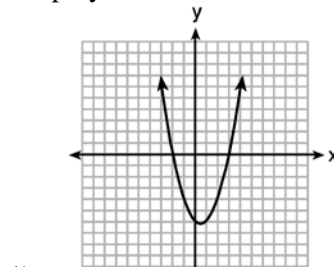
- 757 The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.



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
- 758 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.
- 759 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.

- 760 The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and  $-3$ ?



- 761 Which ordered pair is *not* in the solution set of  $y > -\frac{1}{2}x + 5$  and  $y \leq 3x - 2$ ?
- 1) (5, 3)
  - 2) (4, 3)
  - 3) (3, 4)
  - 4) (4, 4)

762 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.]

763 When directed to solve a quadratic equation by completing the square, Sam arrived at the equation

$$\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$$

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)  $x^2 - 5x + 3 = 0$

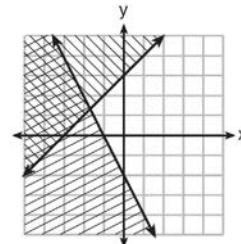
764 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

$$\frac{40 \text{ yd}}{4.5 \text{ sec}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}$$

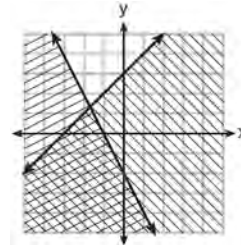
Which ratio is *incorrectly* written to convert his speed?

- 1)  $\frac{3 \text{ ft}}{1 \text{ yd}}$
- 2)  $\frac{5280 \text{ ft}}{1 \text{ mi}}$
- 3)  $\frac{60 \text{ sec}}{1 \text{ min}}$
- 4)  $\frac{60 \text{ min}}{1 \text{ hr}}$

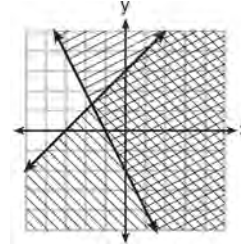
765 Which graph represents the solution of  $y \leq x + 3$  and  $y \geq -2x - 2$ ?



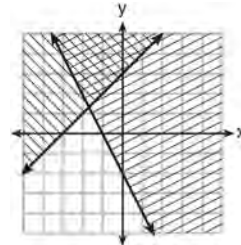
1)



2)



3)



4)

766 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)  $3.00a + 1.50s$

- 767 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.

- 768 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)  $t = \sqrt{\frac{da}{2}}$
- 2)  $t = \sqrt{\frac{2d}{a}}$
- 3)  $t = \left(\frac{da}{d}\right)^2$
- 4)  $t = \left(\frac{2d}{a}\right)^2$

- 769 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)  $5x^2 - x + 1$

- 770 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



775 What are the solutions to the equation

$$x^2 - 8x = 24?$$

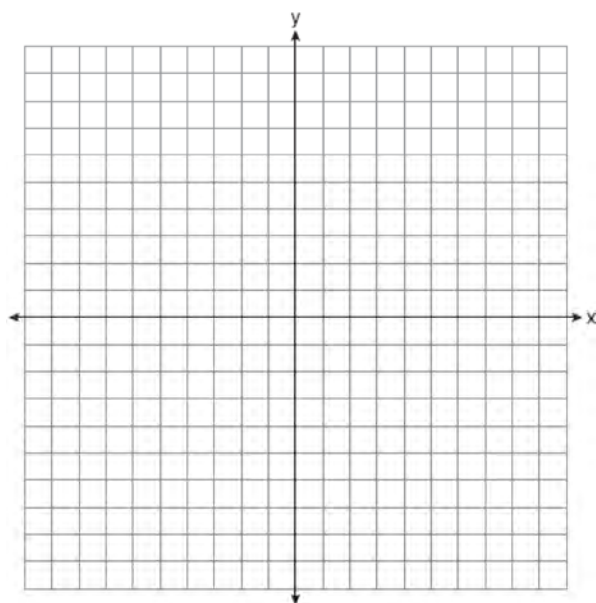
- 1)  $x = 4 \pm 2\sqrt{10}$
- 2)  $x = -4 \pm 2\sqrt{10}$
- 3)  $x = 4 \pm 2\sqrt{2}$
- 4)  $x = -4 \pm 2\sqrt{2}$

776 On the set of axes below, graph the following system of inequalities:

$$2x - y > 4$$

$$x + 3y > 6$$

Label the solution set  $S$ .



Is  $(4,2)$  a solution to this system? Justify your answer.

777 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.

778 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

779 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)  $-3 \pm 4\sqrt{14}$

780 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)  $0.75(7) + 1.25b \leq 22$

781 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



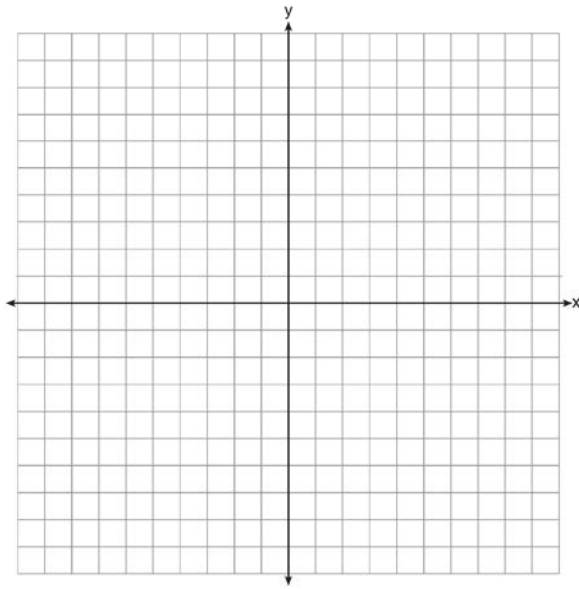
782 The table below represents the function  $F$ .

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

The equation that represents this function is

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

783 On the axes below, graph  $f(x) = |3x|$ .



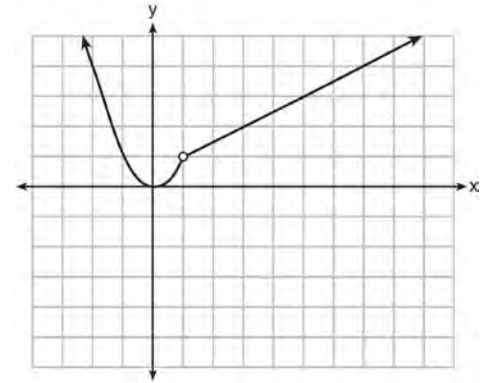
If  $g(x) = f(x) - 2$ , how is the graph of  $f(x)$  translated to form the graph of  $g(x)$ ? If  $h(x) = f(x - 4)$ , how is the graph of  $f(x)$  translated to form the graph of  $h(x)$ ?

784 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)  $(x + 3)^2 = 16$

785 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)  $f(x) = \begin{cases} x^2, & x < 1 \\ \frac{1}{2}x + \frac{1}{2}, & x > 1 \end{cases}$
- 3)  $f(x) = \begin{cases} x^2, & x < 1 \\ 2x - 7, & x > 1 \end{cases}$
- 4)  $f(x) = \begin{cases} x^2, & x < 1 \\ \frac{3}{2}x - \frac{9}{2}, & x > 1 \end{cases}$

786 Solve  $8m^2 + 20m = 12$  for  $m$  by factoring.

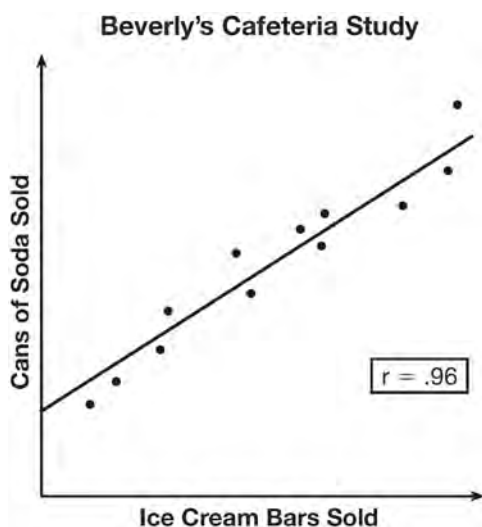
787 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

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

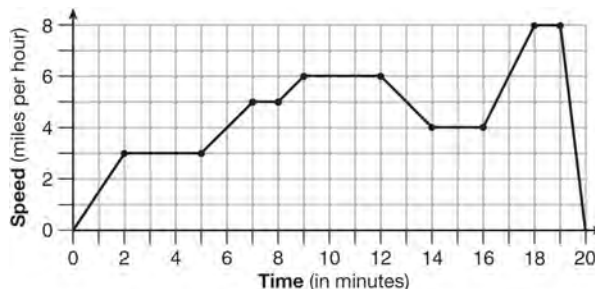
788 Beverly did a study this past spring using data she collected from a cafeteria. She recorded data weekly for ice cream sales and soda sales. Beverly found the line of best fit and the correlation coefficient, as shown in the diagram below.



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

789 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.

790 Four expressions are shown below.

- I  $2(2x^2 - 2x - 60)$
- II  $4(x^2 - x - 30)$
- III  $4(x + 6)(x - 5)$
- IV  $4x(x - 1) - 120$

The expression  $4x^2 - 4x - 120$  is equivalent to

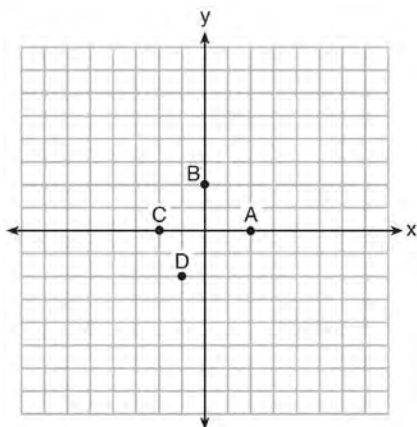
- 1) I and II, only
- 2) II and IV, only
- 3) I, II, and IV
- 4) II, III, and IV

- 791 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.

- 792 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
- 793 Express the product of  $2x^2 + 7x - 10$  and  $x + 5$  in standard form.

- 794 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.

- 795 What is the sum of  $3x\sqrt{7}$  and  $2x\sqrt{7}$ ?

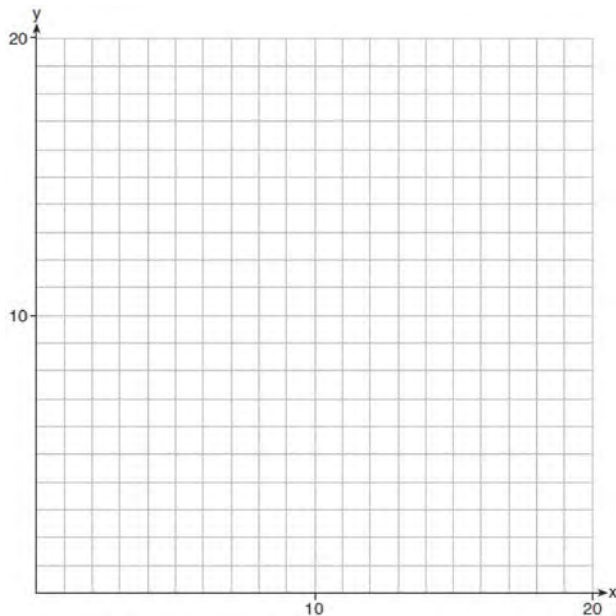
- 1)  $5x\sqrt{7}$   
 2)  $5x^2\sqrt{7}$   
 3)  $5x\sqrt{14}$   
 4)  $5x^2\sqrt{14}$

796 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.

797 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.

798 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)  $P + L$

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

- 1) 1
- 2) -2
- 3) -1
- 4)  $-\frac{13}{3}$

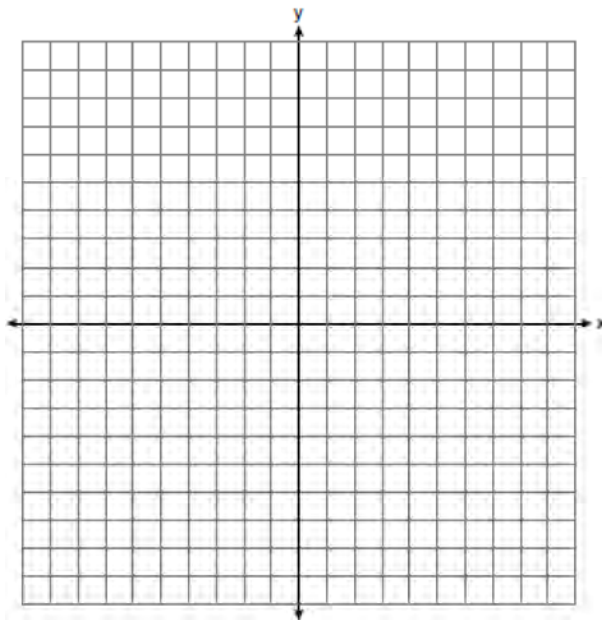
- 800 a) Given the function  $f(x) = -x^2 + 8x + 9$ , state whether the vertex represents a maximum or minimum point for the function. Explain your answer.  
 b) Rewrite  $f(x)$  in vertex form by completing the square.

801 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.

802 On the set of axes below, graph the inequality  $2x + y > 1$ .



804 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

805 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)  $9x^2 - 6x + 1 = 5$

803 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)  $(x - 3)^2 = 3$

806 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.

807 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

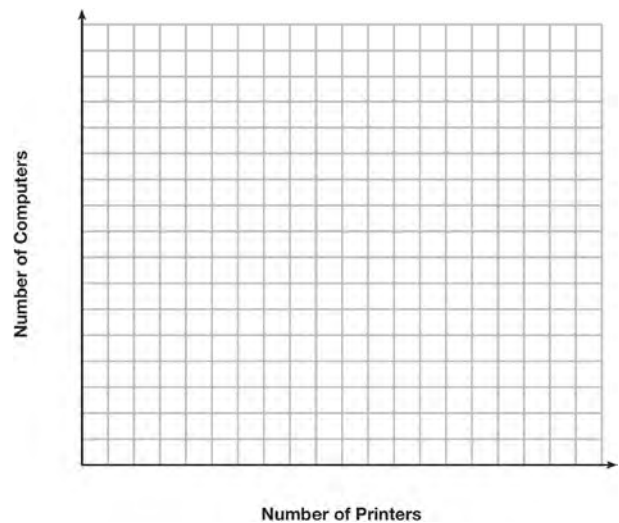
808 In 2013, the United States Postal Service charged \$0.46 to mail a letter weighing up to 1 oz. and \$0.20 per ounce for each additional ounce. Which function would determine the cost, in dollars,  $c(z)$ , of mailing a letter weighing  $z$  ounces where  $z$  is an integer greater than 1?

- 1)  $c(z) = 0.46z + 0.20$
- 2)  $c(z) = 0.20z + 0.46$
- 3)  $c(z) = 0.46(z - 1) + 0.20$
- 4)  $c(z) = 0.20(z - 1) + 0.46$

809 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.

810 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.



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.

811 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

812 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

<b>Day (n)</b>	1	2	3	4	5
<b>Height (cm)</b>	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.

813 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

814 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.

815 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)  $3000(1 - 0.02)^{18}$

816 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)  $0.79 + 4.50r \leq 16.00$ ; 3 rides
- 2)  $0.79 + 4.50r \leq 16.00$ ; 4 rides
- 3)  $4.50 + 0.79r \leq 16.00$ ; 14 rides
- 4)  $4.50 + 0.79r \leq 16.00$ ; 15 rides

817 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)  $P(x) = -0.5x^2 + 500x + 350$

818 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  $f(x) > 0$ .

- 819 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

<b>Number of Hours, <math>x</math></b>	1	2	3	4	5	6	7	8	9	10
<b>Number of Bacteria, <math>B(x)</math></b>	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.

- 820 The table below shows the number of SAT prep classes five students attended and the scores they received on the test.

<b>Number of Prep Classes Attended (<math>x</math>)</b>	3	1	6	7	6
<b>Math SAT Score (<math>y</math>)</b>	500	410	620	720	500

State the linear regression equation for this data set, rounding all values to the *nearest hundredth*. State the correlation coefficient, rounded to the *nearest hundredth*. State what this correlation coefficient indicates about the linear fit of the data.

- 821 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?

- 0.98, the percent of money in the account initially
- 0.98, the percent of money in the account after  $x$  years
- 5000, the amount of money in the account initially
- 5000, the amount of money in the account after  $x$  years

- 822 Let  $f$  be a function such that  $f(x) = 2x - 4$  is defined on the domain  $2 \leq x \leq 6$ . The range of this function is

- $0 \leq y \leq 8$
- $0 \leq y < \infty$
- $2 \leq y \leq 6$
- $-\infty < y < \infty$

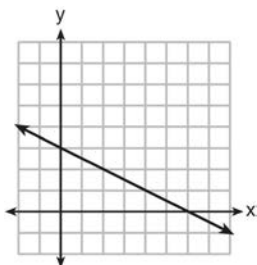
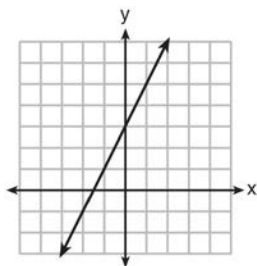
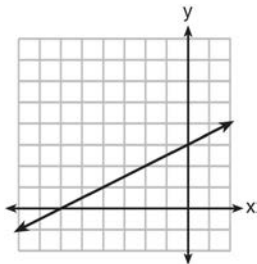
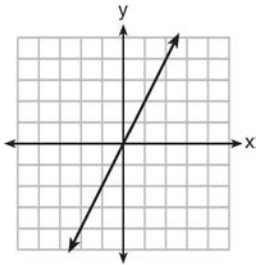
- 823 Given  $2x + ax - 7 > -12$ , determine the largest integer value of  $a$  when  $x = -1$ .

- 824 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?

- 6
- 7
- 8
- 9



- 825 Which graph shows a line where each value of  $y$  is three more than half of  $x$ ?



- 826 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

- 827 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)  $y = x^2 - 10x + 24$

- 828 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.

- 829 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

- 830 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)  $c = 60 + 0.05d$

- 831 Factor the expression  $x^4 + 6x^2 - 7$  completely.

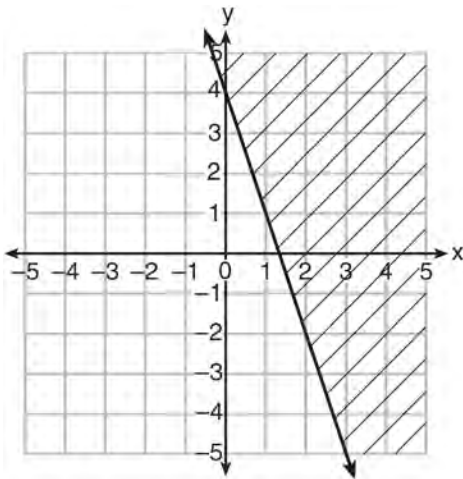
- 832 Emma recently purchased a new car. She decided to keep track of how many gallons of gas she used on five of her business trips. The results are shown in the table below.

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*.)

- 833 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.

- 834 Which inequality is represented in the graph below?



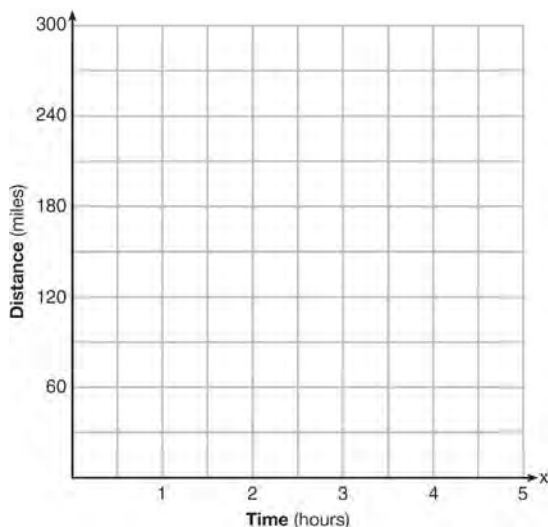
- 1)  $y \geq -3x + 4$
- 2)  $y \leq -3x + 4$
- 3)  $y \geq -4x - 3$
- 4)  $y \leq -4x - 3$

- 835 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

- 836 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.

- 837 Julia is 4 years older than twice Kelly's age,  $x$ . The product of their ages is 96. Write an equation that models this situation. Determine Kelly's age algebraically. State the difference between Julia's and Kelly's ages, in years.

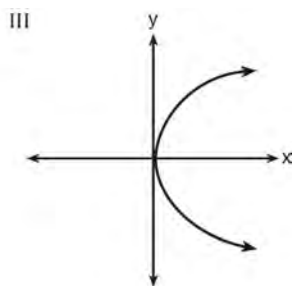
838 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination. On the set of axes below, draw a graph that models the driver's distance from home.



839 Which representations are functions?

I

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



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

840 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%

841 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

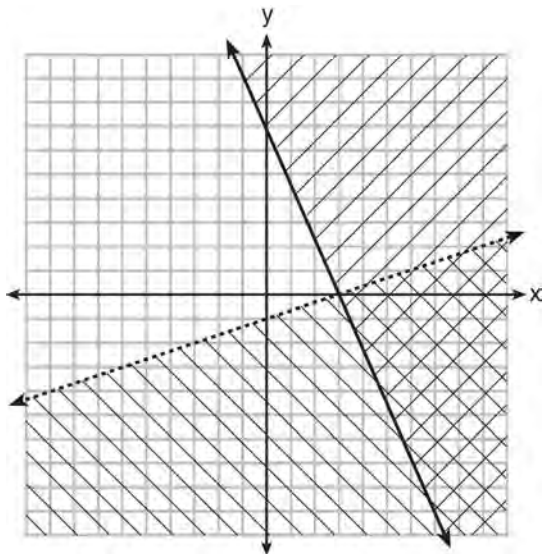
Which set of statements about the mean and standard deviation is true?

- 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  $B$

842 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?

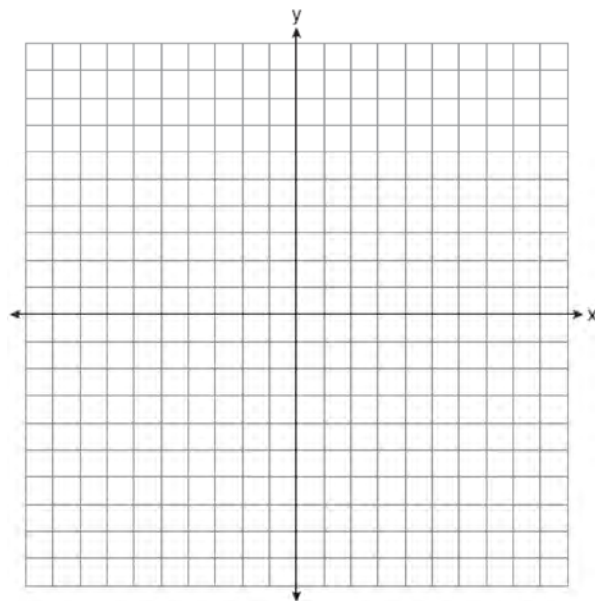
- 1) The commercial costs \$0 to produce and \$110 per airing up to \$900.
- 2) The commercial costs \$110 to produce and \$900 each time it is aired.
- 3) The commercial costs \$900 to produce and \$110 each time it is aired.
- 4) The commercial costs \$1010 to produce and can air an unlimited number of times.

- 843 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)
- 844 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.
- 845 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

- 846 Draw the graph of  $y = \sqrt{x} - 1$  on the set of axes below.

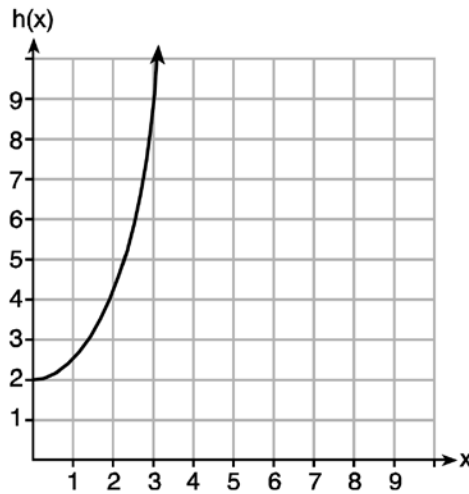


- 847 What is an equation of the line that passes through the points (2,7) and (-1,3)?
- 1)  $y - 2 = \frac{3}{4}(x - 7)$
  - 2)  $y - 2 = \frac{4}{3}(x - 7)$
  - 3)  $y - 7 = \frac{3}{4}(x - 2)$
  - 4)  $y - 7 = \frac{4}{3}(x - 2)$
- 848 The volume of a large can of tuna fish can be calculated using 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.

849 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



The correct list of functions ordered from greatest to least by average rate of change over the interval  $0 \leq x \leq 3$  is

- 1)  $f(x)$ ,  $g(x)$ ,  $h(x)$
- 2)  $h(x)$ ,  $g(x)$ ,  $f(x)$
- 3)  $g(x)$ ,  $f(x)$ ,  $h(x)$
- 4)  $h(x)$ ,  $f(x)$ ,  $g(x)$

850 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.

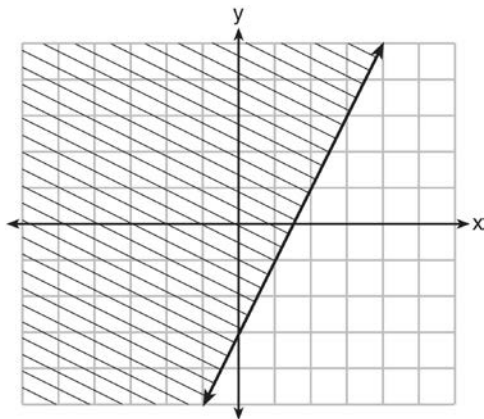
851 Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy's age,  $j$ , if he is the younger man?

- 1)  $j^2 + 2 = 783$
- 2)  $j^2 - 2 = 783$
- 3)  $j^2 + 2j = 783$
- 4)  $j^2 - 2j = 783$

852 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

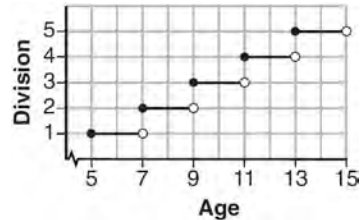
853 The graph of an inequality is shown below.



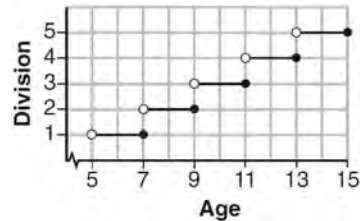
- a) Write the inequality represented by the graph.
- b) On the same set of axes, graph the inequality  $x + 2y < 4$ .
- c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point  $(2, 1)$  is in the solution set for this system of inequalities. Determine and state whether you agree with Oscar. Explain your reasoning.

854 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.

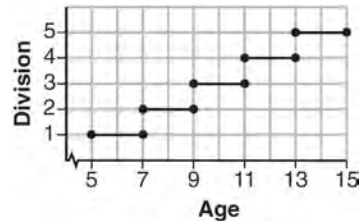
855 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?



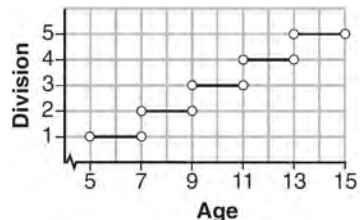
1)



2)



3)



4)

856 Given the following quadratic functions:

$$g(x) = -x^2 - x + 6$$

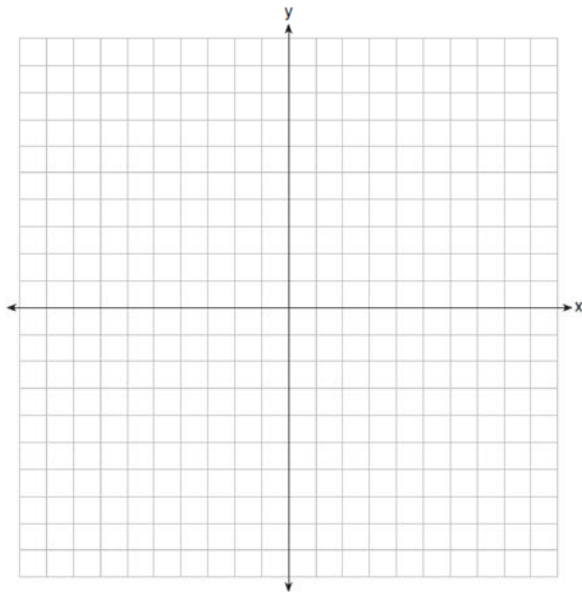
and

<b>x</b>	-3	-2	-1	0	1	2	3	4	5
<b>n(x)</b>	-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  $g(x) = 0$ .

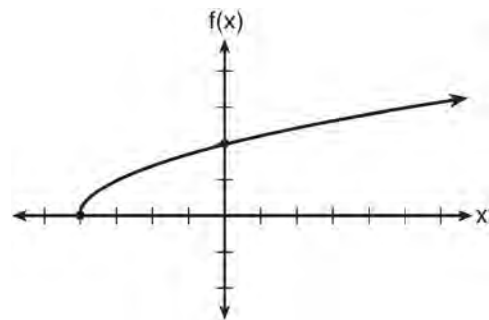
857 On the set of axes below, draw the graph of the equation  $y = -\frac{3}{4}x + 3$ .



Is the point (3,2) a solution to the equation?  
 Explain your answer based on the graph drawn.

858 In the equation  $x^2 + 10x + 24 = (x + a)(x + b)$ ,  $b$  is an integer. Find algebraically *all* possible values of  $b$ .

859 The graph of the function  $f(x) = \sqrt{x+4}$  is shown below.



The domain of the function is

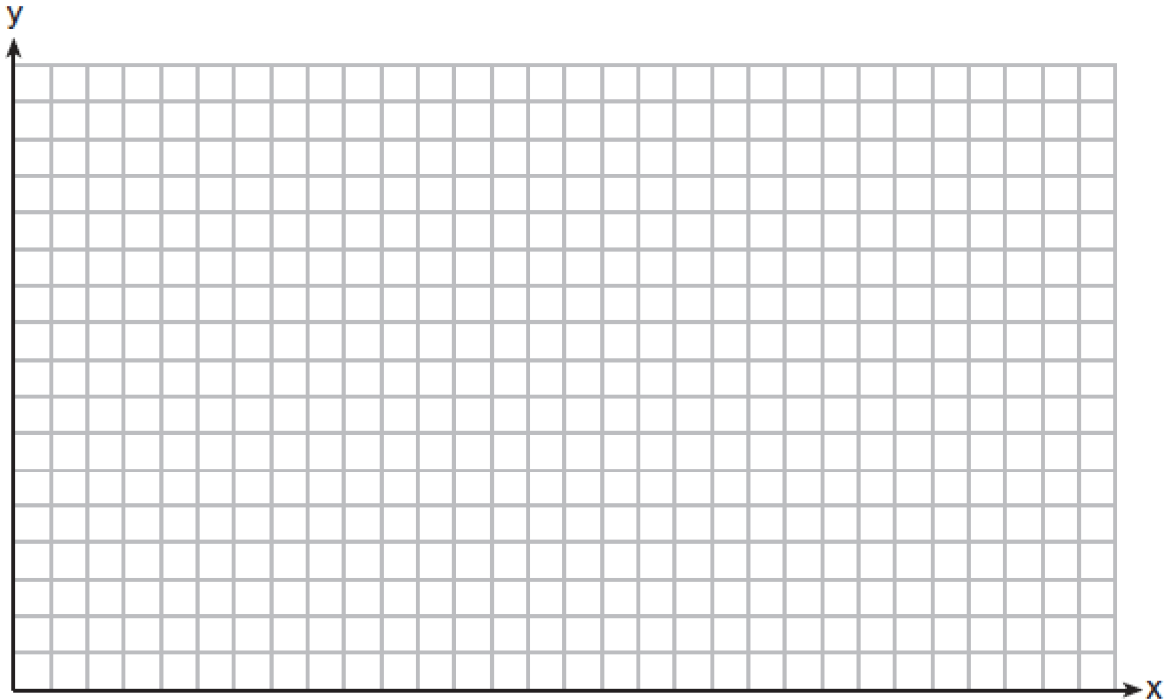
- 1)  $\{x | x > 0\}$
- 2)  $\{x | x \geq 0\}$
- 3)  $\{x | x > -4\}$
- 4)  $\{x | x \geq -4\}$

860 The piecewise function  $f(x)$  is given below.

$$f(x) = \begin{cases} 2x - 3, & x > 3 \\ -x^2 + 15, & x \leq 3 \end{cases}$$

State the value of  $f(3)$ . Justify your answer.

- 861 A football player attempts to kick a football over a goal post. The path of the football can be modeled by the function  $h(x) = -\frac{1}{225}x^2 + \frac{2}{3}x$ , 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  $0 \leq x \leq 150$ .



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.

- 862 Jim had a bag of coins. The number of nickels,  $n$ , and the number of quarters,  $q$ , totaled 28 coins. The combined value of the coins was \$4. Write a system of equations that models this situation. Use your system of equations to algebraically determine both the number of quarters,  $q$ , and the number of nickels,  $n$ , that Jim had in the bag. Jim was given an additional \$3.00 that was made up of equal numbers of nickels and quarters. How many of each coin was he given? Justify your answer.
- 863 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.



864 Christopher looked at his quiz scores shown below for the first and second semester of his Algebra class.

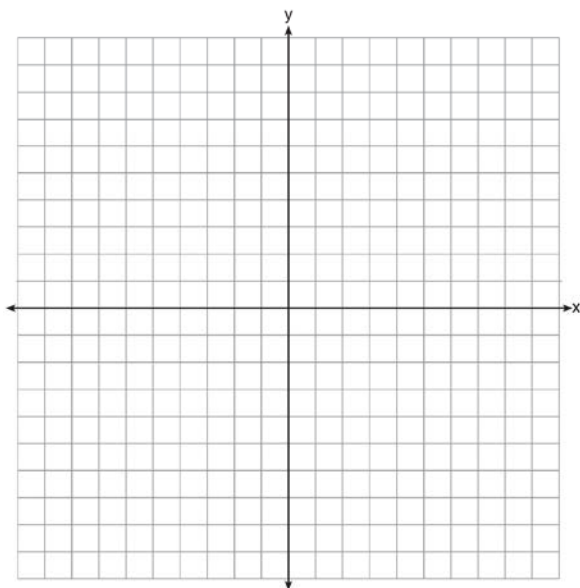
Semester 1: 78, 91, 88, 83, 94

Semester 2: 91, 96, 80, 77, 88, 85, 92

Which statement about Christopher's performance is correct?

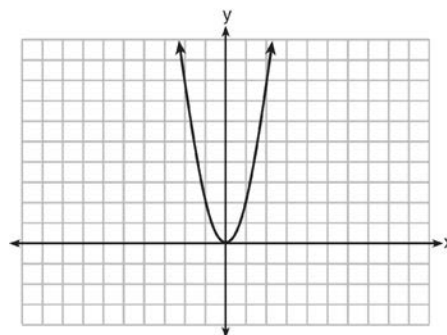
- 1) The interquartile range for semester 1 is greater than the interquartile range for semester 2.
- 2) The median score for semester 1 is greater than the median score for semester 2.
- 3) The mean score for semester 2 is greater than the mean score for semester 1.
- 4) The third quartile for semester 2 is greater than the third quartile for semester 1.

865 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  $y = |x|$ .

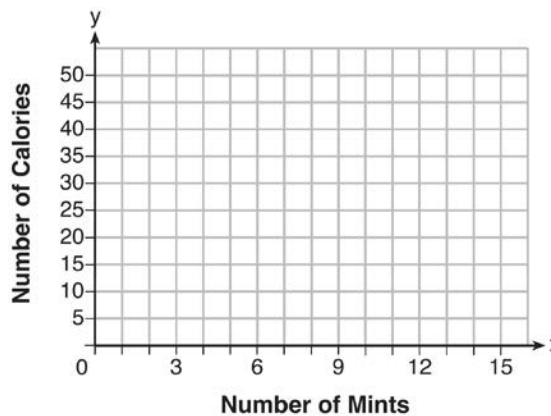
866 The graph of the equation  $y = ax^2$  is shown below.



If  $a$  is multiplied by  $-\frac{1}{2}$ , 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

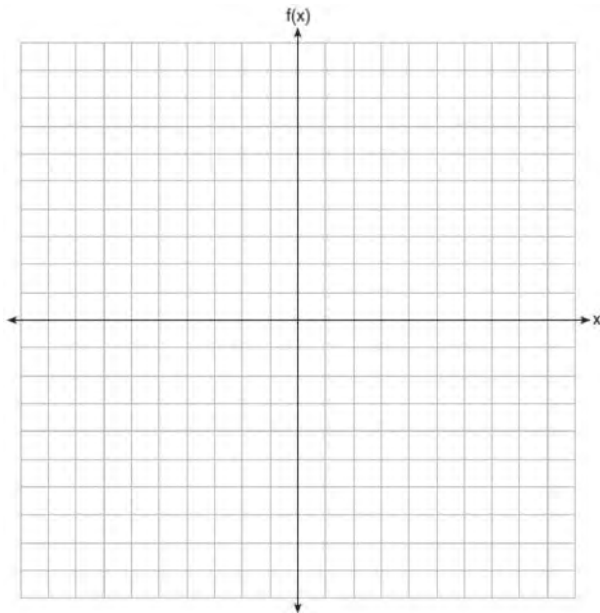
867 Max purchased a box of green tea mints. The nutrition label on the box stated that a serving of three mints contains a total of 10 Calories. On the axes below, graph the function,  $C$ , where  $C(x)$  represents the number of Calories in  $x$  mints.



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.

- 868 Graph the following function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -3 \leq x < 1 \\ 4, & 1 \leq x \leq 8 \end{cases}$$



- 869 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?

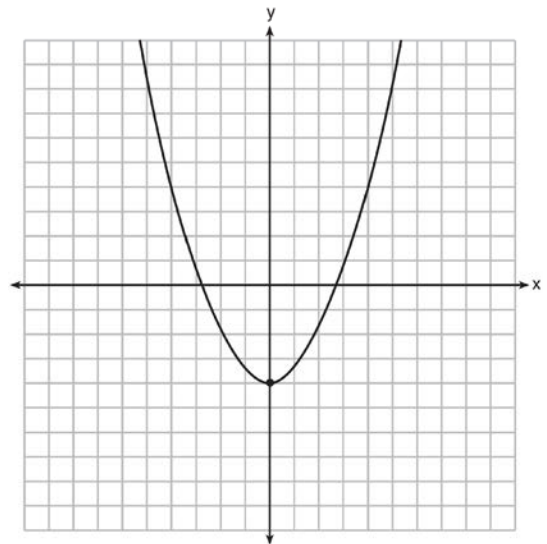
- 1)  $m + f = 3.95$   
 $m + 0.005 = f$
- 2)  $m - 3.95 = f$   
 $f + 0.005 = m$
- 3)  $f - 3.95 = m$   
 $m + 0.005 = f$
- 4)  $m + f = 3.95$   
 $f + 0.005 = m$

- 870 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)  $6x^2 - 6x - 11$

- 871 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.

- 872 Solve the following systems of equations algebraically for all values of  $x$  and  $y$ :

$$y = x^2 + 5x - 17$$

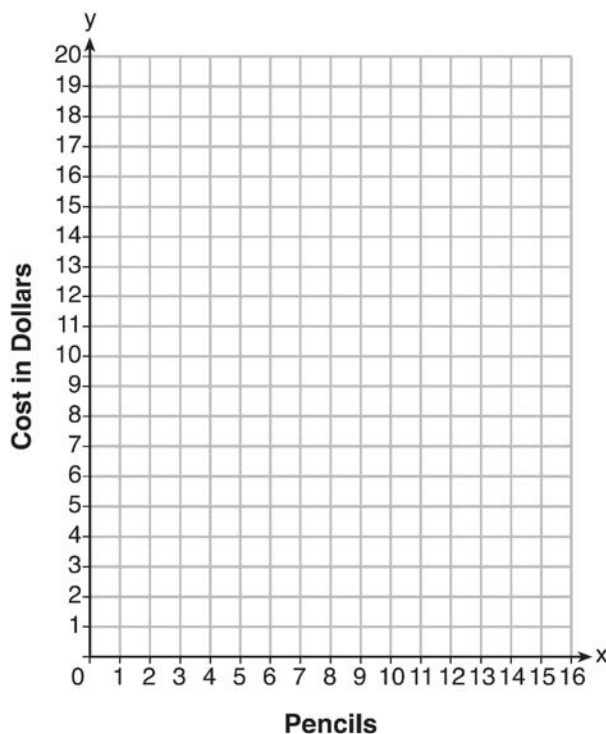
$$x - y = 5$$

873 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.

874 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.

$$c(x) = \begin{cases} 1.75x, & \text{if } 0 \leq x \leq 9 \\ 1.25x, & \text{if } x \geq 10 \end{cases}$$

Create a graph of  $c$  on the axes below.



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.

875 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?

876 Given the following expressions:

$$\begin{array}{ll} \text{I. } -\frac{5}{8} + \frac{3}{5} & \text{III. } (\sqrt{5}) \cdot (\sqrt{5}) \\ \text{II. } \frac{1}{2} + \sqrt{2} & \text{IV. } 3 \cdot (\sqrt{49}) \end{array}$$

Which expression(s) result in an irrational number?

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

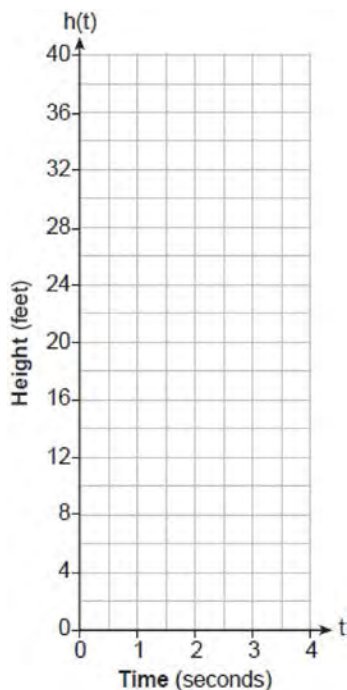
877 Which trinomial is equivalent to

$$3(x-2)^2 - 2(x-1)?$$

- 1)  $3x^2 - 2x - 10$
- 2)  $3x^2 - 2x - 14$
- 3)  $3x^2 - 14x + 10$
- 4)  $3x^2 - 14x + 14$

878 Express the equation  $x^2 - 8x = -41$  in the form  $(x-p)^2 = q$ .

- 879 While playing golf, Laura hit her ball from the ground. The height, in feet, of her golf ball can be modeled by  $h(t) = -16t^2 + 48t$ , where  $t$  is the time in seconds. Graph  $h(t)$  on the set of axes below.



What is the maximum height, in feet, that the golf ball reaches on this hit? How many seconds does it take the golf ball to hit the ground?

- 880 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

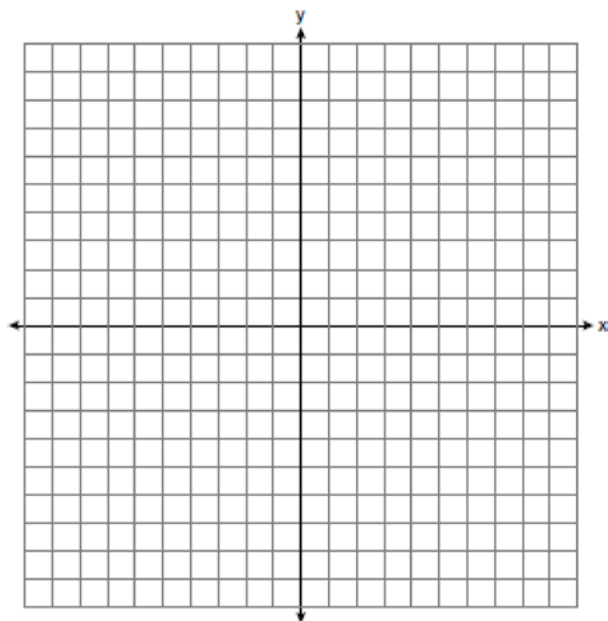
- 1)  $r = \sqrt{\frac{V}{\pi h}}$
- 2)  $r = \sqrt{V\pi h}$
- 3)  $r = 2V\pi h$
- 4)  $r = \frac{V}{2\pi}$

- 881 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)  $-7 \pm \sqrt{3}$

- 882 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.



883 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

884 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.

885 Solve the inequality below to determine and state the smallest possible value for  $x$  in the solution set.

$$3(x + 3) \leq 5x - 3$$

886 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)  $0.05(4x) + 0.10(x) = \$1.25$

887 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)  $(x^2 + 6)(x^2 - 6)$

888 If  $f(x) = x^2 - 2x - 8$  and  $g(x) = \frac{1}{4}x - 1$ , 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

889 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.

890 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

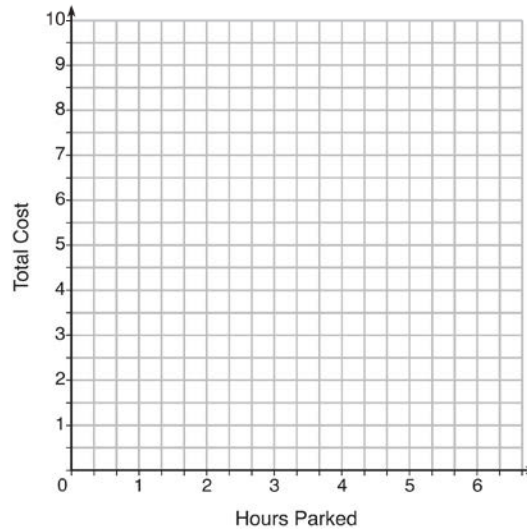
891 Which statement is *not* always true?

- 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.

892 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.

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

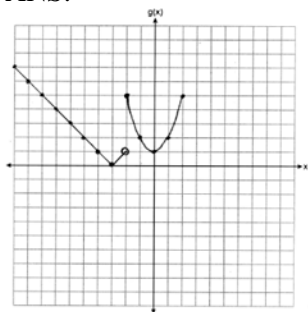
894 The value of the  $x$ -intercept for the graph of  $4x - 5y = 40$  is

- 1) 10
- 2)  $\frac{4}{5}$
- 3)  $-\frac{4}{5}$
- 4) -8

## Algebra I Regents at Random Worksheets Answer Section

- 1 ANS: 3                      PTS: 2                      REF: 012402ai                      NAT: F.IF.A.1  
TOP: Defining Functions
- 2 ANS: 1                      PTS: 2                      REF: 012401ai                      NAT: F.IF.B.4  
TOP: Relating Graphs to Events
- 3 ANS: 2                      PTS: 2                      REF: 062314ai                      NAT: A.CED.A.1  
TOP: Modeling Linear Inequalities
- 4 ANS: 4                      PTS: 2                      REF: 012323ai                      NAT: N.Q.A.1  
TOP: Conversions
- 5 ANS: 4                      PTS: 2                      REF: 062323ai                      NAT: A.SSE.A.1  
TOP: Modeling Expressions
- 6 ANS: 1                      PTS: 2                      REF: 062303ai                      NAT: A.REI.D.10  
TOP: Identifying Solutions
- 7 ANS: 1  
 $a_5 = 4(-3)^{5-1} = 324$
- PTS: 2                      REF: 012317ai                      NAT: F.BF.A.1                      TOP: Sequences  
KEY: explicit
- 8 ANS: 2  
 $x^2 - 6x + 9 = -4 + 9$   
 $x^2 - 6x + 9 = 5$   
 $(x - 3)^2 = 5$
- PTS: 2                      REF: 082320ai                      NAT: A.REI.B.4                      TOP: Solving Quadratics  
KEY: completing the square
- 9 ANS: 4  
 $2x^2 = 72$   
 $x^2 = 36$   
 $x = \pm 6$
- PTS: 2                      REF: 062318ai                      NAT: A.REI.B.4                      TOP: Solving Quadratics  
KEY: taking square roots
- 10 ANS: 1                      PTS: 2                      REF: 012305ai                      NAT: F.IF.A.1  
TOP: Defining Functions  
KEY: mixed
- 11 ANS: 3                      PTS: 2                      REF: 082312ai                      NAT: F.LE.B.5  
TOP: Modeling Exponential Functions

12 ANS:



PTS: 2 REF: 012332ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

13 ANS: 3 PTS: 2 REF: 062316ai NAT: F.BF.B.3

TOP: Graphing Absolute Value Functions

14 ANS:

 $y = 184.89x - 1706.07$ , 0.99, As the height of the horse increases, the weight of the horse increases.

PTS: 4 REF: 062336ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

15 ANS:

$$x^2 - 9x - 36 = 0$$

$$(x - 12)(x + 3) = 0$$

$$x = 12, -3$$

PTS: 2 REF: 082329ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

16 ANS:

$$18x^2 - 2 = 2(9x^2 - 1) = 2(3x + 1)(3x - 1)$$

PTS: 2 REF: 082331ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

17 ANS:

$$-2.4(x + 1.4) = 6.8x - 22.68$$

$$-2.4x - 3.36 = 6.8x - 22.68$$

$$19.32 = 9.2x$$

$$2.1 = x$$

PTS: 2 REF: 062325ai NAT: A.REI.B.3 TOP: Solving Linear Equations

18 ANS: 1 PTS: 2 REF: 012310ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions



19 ANS:

$$\frac{15-3}{4-1} = \frac{12}{3} = 4$$

PTS: 2 REF: 012328ai NAT: F.IF.A.3 TOP: Sequences  
KEY: difference or ratio

20 ANS:

$$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-9)}}{2(1)} = \frac{-3 \pm \sqrt{45}}{2} \approx -4.85, 1.85$$

PTS: 2 REF: 082332ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: quadratic formula

21 ANS:

$$d = \frac{17-5}{5-1} = 3; a_{21} = 5 + (21-1)(3) = 65$$

PTS: 2 REF: 082330ai NAT: F.BF.A.1 TOP: Sequences  
KEY: explicit

22 ANS: 3

$$(3x^2 + 4x - 8) + 22 - 10x = 3x^2 - 6x + 14$$

PTS: 2 REF: 082302ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: addition

23 ANS: 1 PTS: 2 REF: 062307ai NAT: F.LE.A.3  
TOP: Families of Functions

24 ANS: 3

$f$  and  $h$ 's vertex is  $(-2, 5)$ .  $g$ 's axis of symmetry is  $x = -1.5$ .

PTS: 2 REF: 062319ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

25 ANS: 4

$$\frac{53-1129}{2013-2006} \approx -153.71$$

PTS: 2 REF: 082323ai NAT: F.IF.B.6 TOP: Rate of Change  
26 ANS: 3 PTS: 2 REF: 082309ai NAT: A.SSE.A.1  
TOP: Modeling Expressions

27 ANS:

$$\frac{8 \pm \sqrt{(-8)^2 - 4(3)(3)}}{2(3)} \approx 0.5, 2.2$$

PTS: 2 REF: 062332ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: quadratic formula

28 ANS:

	Horse	Dolphin	Penguin	Total
Male	28	18	23	69
Female	14	42	25	81
Total	42	60	48	150

PTS: 2 REF: 082326ai NAT: S.ID.B.5 TOP: Frequency Tables  
KEY: two-way

29 ANS: 3 PTS: 2 REF: 012303ai NAT: A.SSE.A.1  
TOP: Modeling Expressions

30 ANS: 1 PTS: 2 REF: 062313ai NAT: A.SSE.B.3  
TOP: Modeling Exponential Functions

31 ANS: 4  
 $x^2 - 12x + 36 = 10 + 36$   
 $(x - 6)^2 = 46$

PTS: 2 REF: 012319ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: completing the square

32 ANS:  
The function is not defined at  $x = 3$  or  $x > 4$ .

PTS: 2 REF: 082327ai NAT: F.IF.A.2 TOP: Domain and Range  
33 ANS: 1 PTS: 2 REF: 082306ai NAT: A.CED.A.1  
TOP: Geometric Applications of Quadratics

34 ANS: 2 PTS: 2 REF: 062312ai NAT: A.CED.A.2  
TOP: Geometric Applications of Quadratics

35 ANS: 4 PTS: 2 REF: 012405ai NAT: F.LE.A.1  
TOP: Families of Functions

36 ANS: 4  
 $x^2 + 2x + 1 = 7x - 5$   
 $x^2 - 5x + 6 = 0$   
 $(x - 3)(x - 2) = 0$   
 $x = 3, 2$

PTS: 2 REF: 012312ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems  
37 ANS:

$$(x + 5)^2 + x^2 - 18 = x^2 + 10x + 25 + x^2 - 18 = 2x^2 + 10x + 7$$

PTS: 2 REF: 062329ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: multiplication

38 ANS:

$$4x^3 - 49x = x(4x^2 - 49) = x(2x + 7)(2x - 7)$$

PTS: 2 REF: 012331ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares KEY: higher power

39 ANS: 1

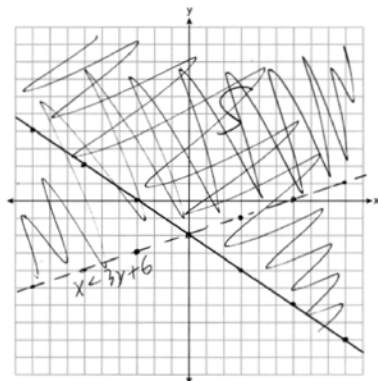
PTS: 2

REF: 082305ai

NAT: F.BF.B.3

TOP: Graphing Polynomial Functions KEY: bimodalgraph

40 ANS:

; No, because  $4 < 3(-2) + 6$  is false.

PTS: 4

REF: 062335ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

41 ANS: 4

$$2A = (b_1 + b_2)h$$

$$\frac{2A}{b_1 + b_2} = h$$

PTS: 2

REF: 062315ai

NAT: A.CED.A.4

TOP: Transforming Formulas

42 ANS: 1

PTS: 2

REF: 012314ai

NAT: A.SSE.A.2

TOP: Factoring Polynomials

43 ANS:

$$20-30; 10000; \frac{4000 - 10000}{40 - 30} = -600. \text{ The population decreases by 600 each year.}$$

PTS: 4

REF: 012333ai

NAT: F.IF.B.4

TOP: Relating Graphs to Events

44 ANS: 4

$$w = 2(3) + 7 = 13$$

PTS: 2

REF: 012302ai

NAT: A.REI.D.10

TOP: Identifying Solutions

45 ANS: 2

$$x = \frac{-2}{2(1)} = -1; f(-1) = (-1)^2 + 2(-1) - 5 = -6$$

PTS: 2

REF: 082316ai

NAT: F.IF.A.2

TOP: Domain and Range

46 ANS:  
 $y = 0.41x - 2.31$ , 0.99, strong

PTS: 4 REF: 082335ai NAT: S.ID.B.6 TOP: Regression  
 KEY: linear with correlation coefficient

47 ANS: 1 PTS: 2 REF: 012308ai NAT: F.LE.A.1  
 TOP: Families of Functions

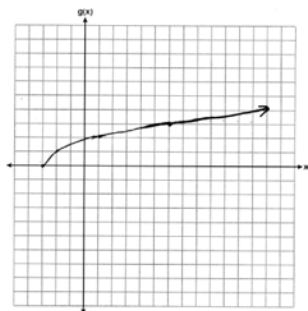
48 ANS:

$$\frac{2}{\sqrt{144}} + \frac{\sqrt{169}}{3} = \frac{2}{12} + \frac{13}{3}$$

The sum of two rational numbers is rational.

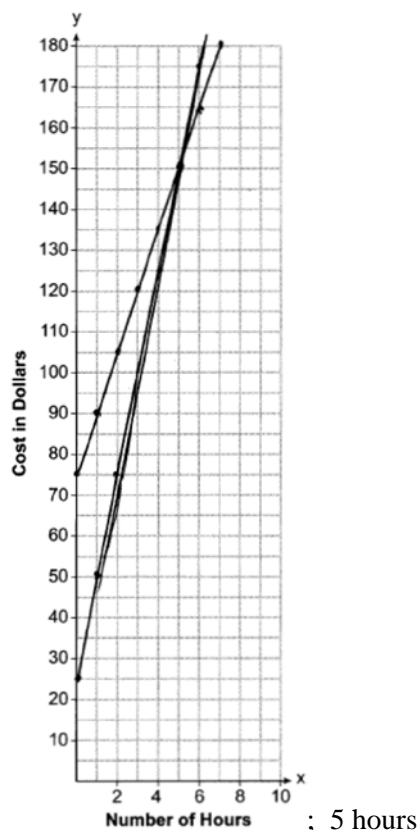
PTS: 2 REF: 082325ai NAT: N.RN.B.3 TOP: Operations with Radicals  
 KEY: classify

49 ANS:



PTS: 2 REF: 012325ai NAT: F.IF.C.7 TOP: Graphing Root Functions

50 ANS:



$$a = 25x + 25; \quad a = 25(10) + 25 = 275 \quad b \text{ will cost less;}$$

$$b = 15x + 75 \quad b = 15(10) + 75 = 225$$

PTS: 6                      REF: 082337ai                      NAT: A.REI.C.6                      TOP: Graphing Linear Systems

51 ANS:

$$15.79x + 5.69y \leq 125 \quad 15.79x + 5.69(9) \leq 125 \quad 4 \text{ cases can be bought. Buying 5 cases totals more than } \$125.$$

$$15.79x \leq 73.79$$

$$x \leq 4.7$$

PTS: 4                      REF: 082333ai                      NAT: A.CED.A.3                      TOP: Modeling Linear Inequalities

52 ANS: 1                      PTS: 2                      REF: 082324ai                      NAT: N.Q.A.1

TOP: Conversions

53 ANS: 2                      PTS: 2                      REF: 012309ai                      NAT: A.APR.A.1

TOP: Operations with Polynomials                      KEY: multiplication

54 ANS: 2

$$\frac{38}{84} \approx 45.2\%$$

PTS: 2                      REF: 062317ai                      NAT: S.ID.B.5                      TOP: Frequency Tables

KEY: two-way

55 ANS:

No, because the number of blocks is increasing by a constant amount.

PTS: 2 REF: 062327ai NAT: F.LE.A.1 TOP: Families of Functions

56 ANS: 2 PTS: 2 REF: 012316ai NAT: F.LE.A.1

TOP: Families of Functions

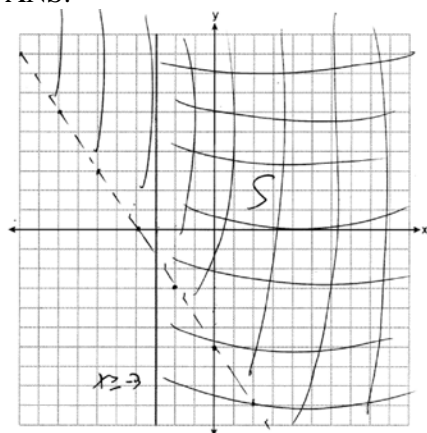
57 ANS: 2 PTS: 2 REF: 062320ai NAT: F.IF.A.2

TOP: Domain and Range

58 ANS: 2 PTS: 2 REF: 012406ai NAT: A.APR.A.1

TOP: Operations with Polynomials KEY: subtraction

59 ANS:

No, as  $-2(-9) = 3(2) + 12$ .

PTS: 4 REF: 082336ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

60 ANS: 2 PTS: 2 REF: 012403ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

61 ANS: 2

$$2 + 3(2a + 1) = 3(a + 2)$$

$$2 + 6a + 3 = 3a + 6$$

$$3a + 5 = 6$$

$$3a = 1$$

$$a = \frac{1}{3}$$

PTS: 2 REF: 012307ai NAT: A.REI.B.3 TOP: Solving Linear Equations

62 ANS: 4 PTS: 2 REF: 082322ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

63 ANS: 2 PTS: 2 REF: 012324ai NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

64 ANS: 1

$$2x^2 - 8x - 3x - 15$$

$$2x^2 - 11x - 15$$

PTS: 2 REF: 012301ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

65 ANS:

6-12; 9-12;  $\frac{74-92}{24-12} = -\frac{3}{2}$ ; The temperature drops  $3^\circ$  every 2 hours.

PTS: 2 REF: 062334ai NAT: F.IF.B.6 TOP: Rate of Change

66 ANS: 3

The value of the third quartile is the last vertical line of the box.

PTS: 2 REF: 082307ai NAT: S.ID.A.1 TOP: Box Plots

KEY: interpret

67 ANS: 4

Each expression equals  $x^9$ .

PTS: 2 REF: 082311ai NAT: A.APR.A.1 TOP: Powers of Powers

68 ANS: 2 PTS: 2 REF: 062309ai NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

69 ANS: 3

$$m(x) = x(x+4)(x-4)$$

PTS: 2 REF: 082313ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

70 ANS:

$$3r + 2d = 31.88; \quad 3r + 2(18.92 - 2r) = 31.88; \quad 2(5.96) + d = 18.92; \quad 31.88 + 18.92 - (5(4.50) + 3(6.50))$$

$$2r + d = 18.92 \quad 3r + 37.84 - 4r = 31.88 \quad 11.92 + d = 18.92 \quad 50.80 - 42$$

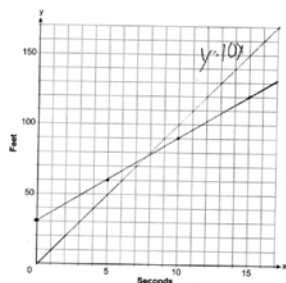
$$r = 5.96 \quad d = 7 \quad 8.80$$

PTS: 6 REF: 062337ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

71 ANS: 4 PTS: 2 REF: 062308ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

72 ANS:



$$y = 10x$$

$$y = 6x + 30$$

$$10x = 6x + 30$$

$$4x = 30$$

$$x = 7.5$$

PTS: 6 REF: 012337ai NAT: A.CED.A.2 TOP: Speed

73 ANS: 1

$$x^2 - 18x + 81 = -77 + 81$$

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

PTS: 2 REF: 062306ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

74 ANS:

$$\frac{46}{39 + 46 + 37} \approx 38\%$$

PTS: 2 REF: 012326ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

75 ANS:

$$l = 3w - 5 \quad 2(3w - 5) + 2w = 90 \quad l = 3(12.5) - 5$$

$$2l + 2w = 90 \quad 6w - 10 + 2w = 90 \quad = 37.5 - 5$$

$$8w = 100 \quad = 32.5$$

$$w = 12.5$$

PTS: 4 REF: 012335ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

76 ANS:

$$2d = t(v_i + v_f)$$

$$\frac{2d}{t} = v_i + v_f$$

$$\frac{2d}{t} - v_i = v_f$$

PTS: 2 REF: 082328ai NAT: A.CED.A.4 TOP: Transforming Formulas

77 ANS: 1 PTS: 2 REF: 062324ai NAT: F.IF.B.5

TOP: Domain and Range

KEY: context



78 ANS: 2

$$g(-4) = -(-4)^2 - (-4) + 5 = -7$$

PTS: 2 REF: 062311ai NAT: F.IF.A.2 TOP: Functional Notation

79 ANS: 1

$$y + 3 = -\frac{4}{3}(x - 6)$$

$$3y + 9 = -4x + 24$$

$$3y = -4x + 15$$

PTS: 2 REF: 082321ai NAT: A.REI.D.10 TOP: Writing Linear Equations  
KEY: other forms

80 ANS: 2

$$5x^2 - x + 4 - 3x^2 + 3x + 6 = 2x^2 + 2x + 10$$

PTS: 2 REF: 062304ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: subtraction

81 ANS: 1

$$(-3)^3 - 2(-3) = -27 + 6 = -21$$

PTS: 2 REF: 082303ai NAT: A.REI.D.10 TOP: Identifying Solutions

82 ANS: 2

TOP: Graphing Quadratic Functions

83 ANS: 3

$$h(x) = 2^x$$

PTS: 2 REF: 082317ai NAT: F.LE.A.1 TOP: Families of Functions

84 ANS: 3

TOP: Relating Graphs to Events

85 ANS: 2

$$f(-2) = -3(-2)^2 + 10 = -12 + 10 = -2$$

PTS: 2 REF: 012304ai NAT: F.IF.A.2 TOP: Functional Notation

86 ANS: 2

$$a_{24} = -5 + (24 - 1)(-6) = -143$$

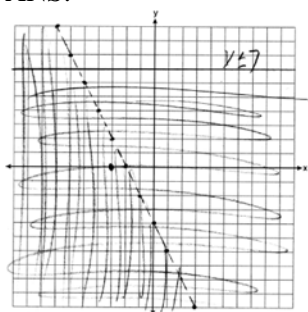
PTS: 2 REF: 062305ai NAT: F.BF.A.1 TOP: Sequences  
KEY: explicit

87 ANS:

$$y = -2.81x + 97.55, -0.97, \text{strong}$$

PTS: 4 REF: 012334ai NAT: S.ID.B.6 TOP: Regression  
KEY: linear with correlation coefficient

88 ANS:



$(-3,0)$  falls within the double-shaded area.

PTS: 4 REF: 012336ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

89 ANS:

$$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)} \approx 0.27, 3.73$$

PTS: 2 REF: 012330ai NAT: A.REI.B.4 TOP: Solving Quadratics

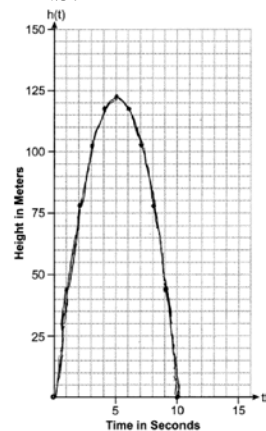
KEY: quadratic formula

90 ANS: 1

$$1) f\left(\frac{-5}{2(6)}\right) \approx -3.04; 2) h(2.5) = (2.5 - 2)(2.5 - 3) = -0.25; 3) g(2) = -2; 4) 0$$

PTS: 2 REF: 012320ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

91 ANS:



$(5, 122.5)$  The rocket is at 122.5m at 5 sec.

PTS: 4 REF: 082334ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: graph

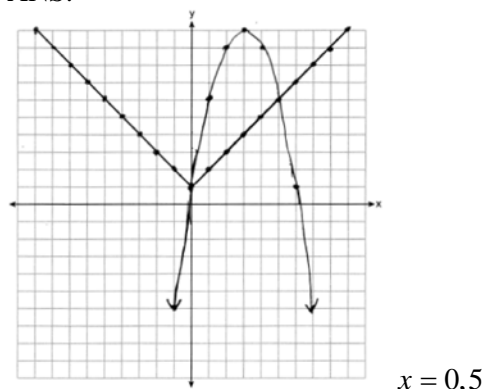
92 ANS: 3 PTS: 2 REF: 012407ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

93 ANS: 1 PTS: 2 REF: 062301ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

94 ANS:



PTS: 4 REF: 062333ai NAT: A.REI.D.11 TOP: Other Systems

95 ANS: 3

The value of the third quartile is the last vertical line of the box.

PTS: 2 REF: 012306ai NAT: S.ID.A.1 TOP: Box Plots

KEY: interpret

96 ANS:

$$2(x^2 + 8x - 9) = 2(x + 9)(x - 1)$$

PTS: 2 REF: 062331ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

97 ANS:

I: Change (4,30) to an open circle. II: Remove (-4,4).

PTS: 2 REF: 062330ai NAT: F.IF.A.1 TOP: Defining Functions

98 ANS:



PTS: 4 REF: 062328ai NAT: S.ID.A.1 TOP: Box Plots

KEY: represent

99 ANS: 3

$$a_{11} = 3(-2)^{11-1} = 3072$$

PTS: 2 REF: 012404ai NAT: F.BF.A.1 TOP: Sequences

KEY: explicit

100 ANS: 4

$$f(0) = 3, g(0) = 4, h(0) = 2, k(0) = 1$$

PTS: 2 REF: 082314ai NAT: F.IF.C.9 TOP: Comparing Functions

101 ANS: 4

$$f(-1) = f(-2) = -2$$

PTS: 2 REF: 082318ai NAT: F.IF.A.2 TOP: Functional Notation

- 102 ANS: 2  
 $-3(x-6) > 2x-2$   
 $-3x+18 > 2x-2$   
 $20 > 5x$   
 $4 > x$
- PTS: 2 REF: 082310ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities
- 103 ANS: 4 PTS: 2 REF: 012313ai NAT: F.IF.B.5  
TOP: Domain and Range KEY: context
- 104 ANS: 2 PTS: 2 REF: 082315ai NAT: F.IF.C.7  
TOP: Graphing Quadratic Functions KEY: key features
- 105 ANS: 3 PTS: 2 REF: 012322ai NAT: A.APR.B.3  
TOP: Zeros of Polynomials
- 106 ANS: 3 PTS: 2 REF: 012311ai NAT: F.BF.A.1  
TOP: Modeling Exponential Functions
- 107 ANS:  
 $-3\left(-\frac{2}{3}x+6 > -12\right)$   
 $2x-18 < 36$   
 $2x < 54$   
 $x < 27$
- PTS: 2 REF: 012327ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities
- 108 ANS: 3  
 $-\frac{2}{5}x \geq \frac{1}{3}x+11$   
 $-\frac{11}{15}x \geq 11$   
 $-\frac{15}{11}\left(-\frac{11}{15}x\right) \leq \left(-\frac{15}{11}\right)11$   
 $x \leq -15$
- PTS: 2 REF: 062322ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities
- 109 ANS: 2  
 $\frac{5(2x-4)}{3} = 5$   
 $10x-20 = 15$   
 $10x = 35$   
 $x = 3.5$
- PTS: 2 REF: 082304ai NAT: A.REI.B.3 TOP: Solving Linear Equations

110 ANS: 3                   PTS: 2                   REF: 062302ai           NAT: N.RN.B.3  
TOP: Operations with Radicals           KEY: classify

111 ANS:  
 $A + B$  is irrational because  $14\sqrt{3}$  cannot be written as the ratio of two integers.  $A \cdot B$  is rational because 99 can be written as the ratio of two integers.

PTS: 2                   REF: 012329ai           NAT: N.RN.B.3           TOP: Operations with Radicals  
KEY: classify

112 ANS: 2  
 $(2x + 7)(x - 3) = 2x^2 - 6x + 7x - 21 = 2x^2 + x - 21$

PTS: 2                   REF: 082308ai           NAT: A.APR.A.1           TOP: Operations with Polynomials  
KEY: multiplication

## Algebra I Regents at Random Worksheets Answer Section

113 ANS: 1

$$\frac{2x^2}{x} = 2x$$

PTS: 2 REF: 082202ai NAT: F.IF.A.3 TOP: Sequences  
KEY: difference or ratio

114 ANS: 1

$$7x + 2 \geq 58$$

$$7x \geq 56$$

$$x \geq 8$$

PTS: 2 REF: 012003ai NAT: A.REI.B.3 TOP: Interpreting Solutions

115 ANS:

$$3y^2 - 12y - 288$$

$$3(y^2 - 4y - 96)$$

$$3(y - 12)(y + 8)$$

PTS: 2 REF: 082232ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

116 ANS: 1

PTS: 2 REF: 012002ai NAT: F.BF.A.1  
TOP: Modeling Exponential Functions

117 ANS: 3

$$10(x - 5) = -15 \quad 4 + 2(x - 2) = 9 \quad \frac{1}{3}x = \frac{3}{2}$$

$$10x - 50 = -15 \quad 4 + 2x - 4 = 9 \quad x = \frac{9}{2}$$

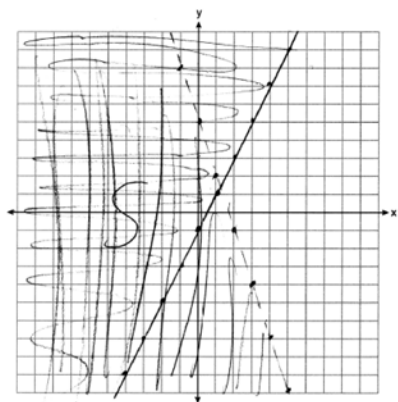
$$10x = 35 \quad 2x = 9 \quad x = \frac{9}{2}$$

$$x = \frac{7}{2}$$

$$x = \frac{9}{2}$$

PTS: 2 REF: 082217ai NAT: A.REI.B.3 TOP: Solving Linear Equations

118 ANS:

Yes, as  $0 + 3(-5) < 5$ 

$$1 \geq 2(-5) - 0$$

PTS: 4

REF: 082236ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

119 ANS: 2

PTS: 2

REF: 062101ai

NAT: F.BF.A.1

TOP: Modeling Linear Functions

120 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.

PTS: 2

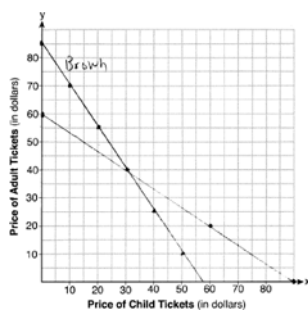
REF: 082227ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: classify

121 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.

PTS: 6

REF: 012037ai

NAT: A.REI.C.6

TOP: Graphing Linear Systems

122 ANS: 3

$$\frac{17-5}{5-1} = \frac{12}{4} = 3$$

PTS: 2

REF: 062215ai

NAT: F.IF.A.3

TOP: Sequences

KEY: difference or ratio

123 ANS: 4

PTS: 2

REF: 062204ai

NAT: A.SSE.A.2

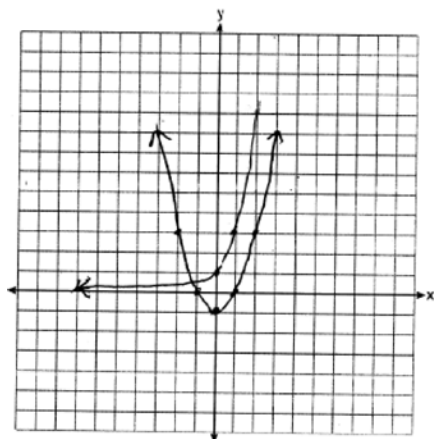
TOP: Factoring Polynomials

KEY: quadratic

124 ANS: 4  
 $31 = 4 + (10 - 1)3$

PTS: 2 REF: 062118ai NAT: F.BF.A.1 TOP: Sequences  
 KEY: explicit

125 ANS:



$f(x) = g(x)$  for one value of  $x$  because the graphs intersect once.

PTS: 4 REF: 062234ai NAT: A.REI.D.11 TOP: Other Systems

126 ANS:  

$$\frac{4 \text{ pints}}{\text{day}} \times \frac{2 \text{ cups}}{1 \text{ pint}} \times \frac{8 \text{ ounces}}{1 \text{ cup}} \times \frac{7 \text{ days}}{\text{week}} = \frac{448 \text{ ounces}}{\text{week}}$$

PTS: 2 REF: 012027ai NAT: N.Q.A.1 TOP: Conversions  
 KEY: dimensional analysis

127 ANS: 3  

$$\frac{138}{192} \approx 72\%$$

PTS: 2 REF: 012010ai NAT: S.ID.B.5 TOP: Frequency Tables  
 KEY: two-way

128 ANS: 4  

$$\frac{x-1}{2} = a$$

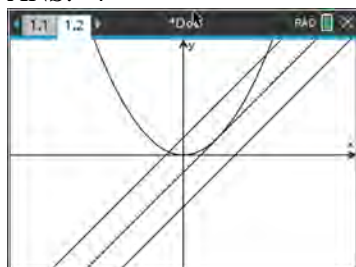
$$x - 1 = 2a$$

$$x = 2a + 1$$

PTS: 2 REF: 062223ai NAT: A.CED.A.4 TOP: Transforming Formulas  
 129 ANS: 2 PTS: 2 REF: 062206ai NAT: F.IF.B.5  
 TOP: Domain and Range KEY: context



130 ANS: 4



PTS: 2 REF: 062216ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

131 ANS:

$$(2x + 3)(3x - 2) = 0$$

$$x = -\frac{3}{2}, \frac{2}{3}$$

PTS: 2 REF: 062230ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

132 ANS: 1

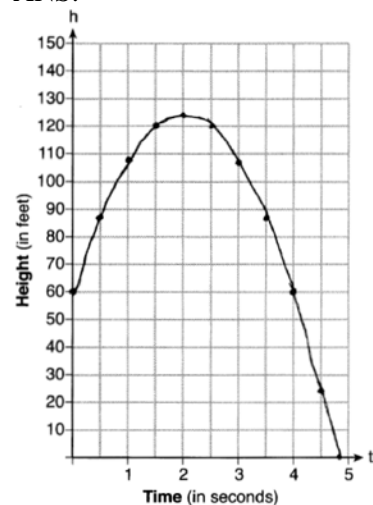
1) -6; 2) 1; 3) -2; 4) -2

PTS: 2 REF: 062115ai NAT: F.IF.C.9 TOP: Comparing Functions

133 ANS: 4 PTS: 2 REF: 012021ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

134 ANS:



$$\frac{h(2) - h(0)}{2 - 0} = 32$$

PTS: 4 REF: 012033ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: graph

135 ANS: 3

$$t(m) = 2(3)^{2m+1} = 2(3)^{2m}(3)^1 = 6(3)^{2m} = 6(3^2)^m = 6(9)^m$$

PTS: 2 REF: 012019ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions



147 ANS: 1

$$2x - 4 = 0 \quad 3x + 4 = 0$$

$$x = 2 \quad x = -\frac{4}{3}$$

PTS: 2

REF: 062212ai

NAT: A.APR.B.3

TOP: Zeros of Polynomials

148 ANS: 2

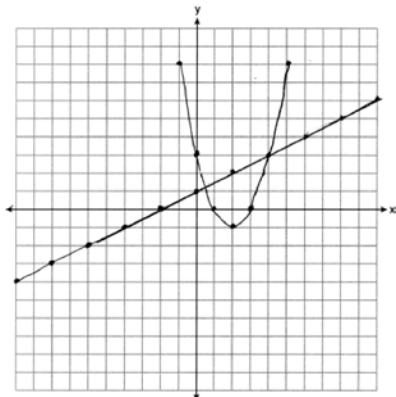
PTS: 2

REF: 062203ai

NAT: F.BF.A.1

TOP: Modeling Linear Functions

149 ANS:

At  $x = \frac{1}{2}$ ,  $f$  intersects  $g$ .

PTS: 4

REF: 082234ai

NAT: A.REI.D.11

TOP: Quadratic-Linear Systems

150 ANS:

$$x^2 - 8x = -6$$

$$x^2 - 8x + 16 = -6 + 16$$

$$(x - 4)^2 = 10$$

$$x - 4 = \pm\sqrt{10}$$

$$x = 4 \pm \sqrt{10}$$

PTS: 2

REF: 012031ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

151 ANS: 1

PTS: 2

REF: 012412ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

152 ANS:

$$61.5 - 51 = 10.5$$

PTS: 6

REF: 082228ai

NAT: S.ID.A.2

TOP: Dispersion

KEY: basic

153 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.

PTS: 4

REF: 012035ai

NAT: S.ID.B.6

TOP: Regression

KEY: linear with correlation coefficient

154 ANS: 2                    PTS: 2                    REF: 062107ai                    NAT: A.CED.A.1  
TOP: Modeling Linear Inequalities

155 ANS: 3                    PTS: 2                    REF: 062113ai                    NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions

156 ANS:  
No. He found another point if  $g(x)$  were a linear function.

PTS: 2                    REF: 062129ai                    NAT: F.LE.A.2                    TOP: Modeling Exponential Functions  
157 ANS: 3

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

$$g(3) = 3(3) + 5 = 14$$

$$f(1) - g(3) = -10$$

PTS: 2                    REF: 012410ai                    NAT: F.IF.A.2                    TOP: Functional Notation  
158 ANS:

$$\frac{5 \pm \sqrt{(-5)^2 - 4(3)(-7)}}{2(3)} = \frac{5 \pm \sqrt{109}}{6} \approx -0.9, 2.6$$

PTS: 2                    REF: 082231ai                    NAT: A.REI.B.4                    TOP: Solving Quadratics  
KEY: quadratic formula

159 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.

PTS: 4                    REF: 082233ai                    NAT: F.IF.B.4                    TOP: Relating Graphs to Events  
160 ANS: 2

$$\left( \frac{\$1824 - 1140}{3 - 0 \text{ yr}} \right) \left( \frac{1 \text{ yr}}{12 \text{ m}} \right) = \frac{\$19}{\text{m}}$$

PTS: 2                    REF: 062105ai                    NAT: F.IF.B.6                    TOP: Rate of Change  
161 ANS:

$$3x^2 + 21x - 4x - 28 - \frac{1}{4}x^2 = 2.75x^2 + 17x - 28$$

PTS: 2                    REF: 012028ai                    NAT: A.APR.A.1                    TOP: Operations with Polynomials  
KEY: multiplication

162 ANS:  
 $1.25x + 0.55(x + 4) + 0.75(x - 2) = 16$      $1.25x + 0.55x + 2.2 + 0.75x - 1.5 = 16$

$$2.55x + 0.7 = 16$$

$$2.55x = 15.3$$

$$x = 6$$

PTS: 4                    REF: 062134ai                    NAT: A.CED.A.1                    TOP: Modeling Linear Equations

163 ANS:  
3 right and 4 down.

PTS: 2 REF: 062226ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions

164 ANS: 4  
 $3x^4 - 4x^2 - 4$

PTS: 2 REF: 062122ai NAT: A.SSE.A.1 TOP: Modeling Expressions

165 ANS: 2  
 $\frac{22.7 \text{ m}}{\text{hr}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1.609 \text{ km}}{1 \text{ m}} = \frac{0.6 \text{ km}}{\text{min}}$

PTS: 2 REF: 062123ai NAT: N.Q.A.1 TOP: Conversions  
KEY: dimensional analysis

166 ANS:  
 $f(x) = x^2 - 14x + 49 - 15 - 49 = (x - 7)^2 - 64$  (7, -64)

PTS: 2 REF: 062130ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

167 ANS:  
Distributive and Addition Property of Equality

PTS: 2 REF: 012029ai NAT: A.REI.A.1 TOP: Identifying Properties

168 ANS: 2 PTS: 2 REF: 012004ai NAT: F.IF.A.1  
TOP: Defining Functions KEY: ordered pairs

169 ANS:  
 $x^2 - 8x = 5$

$$x^2 - 8x + 16 = 5 + 16$$

$$(x - 4)^2 = 21$$

$$x - 4 = \pm\sqrt{21}$$

$$x = 4 \pm \sqrt{21}$$

PTS: 2 REF: 062232ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: completing the square

170 ANS: 2

$$\frac{x-3}{4} + \frac{8}{12} = \frac{17}{12}$$

$$\frac{x-3}{4} = \frac{9}{12}$$

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

$$x-3=3$$

$$x=6$$

PTS: 2 REF: 012005ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
KEY: fractional expressions

171 ANS: 4

I.  $f(4) = -\frac{4}{3}$  and  $g(4) = 2$ ; II.  $f(12) = 4$  and  $g(12) = 4$

PTS: 2 REF: 062111ai NAT: A.REI.D.11 TOP: Other Systems

172 ANS: 4 PTS: 2 REF: 082211ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

173 ANS: 2

The y-intercept of both  $f(x)$  and  $g(x)$  is  $-4$ .

PTS: 2 REF: 012013ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

174 ANS: 2 PTS: 2 REF: 012014ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

175 ANS:

$$w^2 + 3w - 11 = 0 \quad \frac{-3 \pm \sqrt{3^2 - 4(1)(-11)}}{2(1)} = \frac{-3 \pm \sqrt{53}}{2} \approx -5.14, 2.14$$

PTS: 2 REF: 062132ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

176 ANS: 2

$$2x^3 + 3x^2 + 7x - 6$$

PTS: 2 REF: 082216ai NAT: A.SSE.A.1 TOP: Modeling Expressions

177 ANS: 4

$$3K - 5 = 7$$

$$3K = 12$$

$$K = 4$$

PTS: 2 REF: 082205ai NAT: A.REI.D.10 TOP: Identifying Solutions

178 ANS: 4

$$V = \frac{1}{2}a(b+c)h$$

$$2V = a(b+c)h$$

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

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

PTS: 2 REF: 082224ai NAT: A.CED.A.4 TOP: Transforming Formulas

179 ANS: 3 PTS: 2 REF: 082203ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares KEY: quadratic

180 ANS:

$$9C = 5F - 160$$

$$F = \frac{9C + 160}{5}$$

PTS: 2 REF: 062131ai NAT: A.CED.A.4 TOP: Transforming Formulas

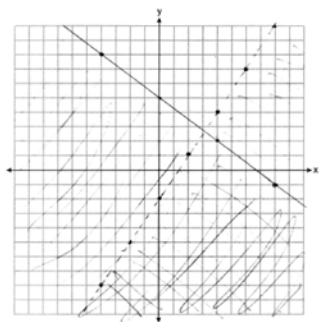
181 ANS:

$y = -0.96x + 64.74$ ,  $r = -0.98$ . There is a strong correlation between the driver's age and the percentage of accidents caused by speeding.

PTS: 4 REF: 062235ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

182 ANS:



No, as (6,3) does not lie in the solution set.

PTS: 4 REF: 062135ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: graph

183 ANS:

$$4y - 12 \leq 8y + 4$$

$$-16 \leq 4y$$

$$-4 \leq y$$

PTS: 2 REF: 062125ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

184 ANS: 1

$$\frac{3}{2}b < 12$$

$$b < 12\left(\frac{2}{3}\right)$$

$$b < 8$$

PTS: 2 REF: 062207ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

185 ANS: 3 PTS: 2 REF: 012414ai NAT: A.SSE.A.1

TOP: Modeling Expressions

186 ANS: 1

$$\frac{12-10}{12-9} = \frac{2}{3} \quad y-6 = \frac{2}{3}(x-3) \quad 18-6 \neq \frac{2}{3}(16-3)$$

PTS: 2 REF: 062124ai NAT: A.REI.D.10 TOP: Identifying Solutions

187 ANS: 1 PTS: 2 REF: 012018ai NAT: F.IF.A.2

TOP: Domain and Range KEY: real domain, absolute value

188 ANS:

The height of the balloon increases 30.5 ft per min. The balloon starts at a height of 8.7 ft.

PTS: 2 REF: 062127ai NAT: F.LE.B.5 TOP: Modeling Linear Functions

189 ANS: 4

$$C(d) = 120 \cdot 2^{3d} = 120 \cdot (2^3)^d = 120 \cdot 8^d$$

PTS: 2 REF: 082218ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

190 ANS: 4 PTS: 2 REF: 062218ai NAT: A.REI.D.10

TOP: Identifying Solutions

191 ANS:

$$(x^2 + 4)(x + 2)(x - 2)$$

PTS: 2 REF: 062128ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares KEY: higher power

192 ANS: 2 PTS: 2 REF: 062116ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

193 ANS:

$$2S = n(a + b)$$

$$\frac{2S}{n} = a + b$$

$$\frac{2S}{n} - a = b$$

PTS: 2 REF: 012032ai NAT: A.CED.A.4 TOP: Transforming Formulas



- 194 ANS: 4  
 $4x^3 + x^2 + 2x$   
 PTS: 2 REF: 012024ai NAT: A.SSE.A.1 TOP: Modeling Expressions
- 195 ANS: 3  
 $f(8) = \frac{3(8)+4}{2} = \frac{28}{2} = 14$   
 PTS: 2 REF: 082201ai NAT: F.IF.A.2 TOP: Functional Notation
- 196 ANS:  
 Exponential, as the value decreases by about 47%/year.  
 PTS: 2 REF: 082226ai NAT: F.LE.A.1 TOP: Families of Functions
- 197 ANS: 2 PTS: 2 REF: 082222ai NAT: F.IF.B.5  
 TOP: Domain and Range KEY: graph
- 198 ANS: 2  
 $x(-4x^2 - x + 6) + 8 = -4x^3 - x^2 + 6x + 8$   
 PTS: 2 REF: 012016ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
 KEY: multiplication
- 199 ANS: 1  
 $Ax + By = C$   
 $By = C - Ax$   
 $y = \frac{C - Ax}{B}$   
 PTS: 2 REF: 062211ai NAT: A.CED.A.4 TOP: Transforming Formulas
- 200 ANS: 2  
 (d) is the product, but not written in standard form.  
 PTS: 2 REF: 062108ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
 KEY: multiplication
- 201 ANS: 2  
 $f(3) = 3(3) - 5 = 4$   
 PTS: 2 REF: 062202ai NAT: F.IF.A.2 TOP: Functional Notation
- 202 ANS:  
 $y = 1.72x + 69.4$ , 0.97, high, positive correlation between the number of jumping jacks and heart rate  
 PTS: 4 REF: 062133ai NAT: S.ID.B.6 TOP: Regression  
 KEY: linear with correlation coefficient
- 203 ANS: 1 PTS: 2 REF: 012413ai NAT: F.IF.C.7  
 TOP: Graphing Quadratic Functions

204 ANS: 1

$$x^2 - 10x + 25 = 13 + 25$$

$$(x - 5)^2 = 38$$

PTS: 2 REF: 082215ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

205 ANS: 4 PTS: 2 REF: 082204ai NAT: F.IF.A.1

TOP: Defining Functions

206 ANS: 1 PTS: 2 REF: 062213ai NAT: A.CED.A.1

TOP: Modeling Linear Equations

207 ANS: 2

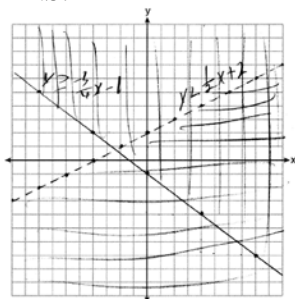
$$a_n = 4n + 8$$

$$a_{35} = 4(35) + 8 = 148$$

PTS: 2 REF: 012008ai NAT: F.BF.A.1 TOP: Sequences

KEY: explicit

208 ANS:

Correct, as  $0 + 2(0) - 4 < 0$ 

$$3(0) + 4(0) + 4 \geq 0$$

PTS: 4 REF: 012034ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: graph

209 ANS: 4 PTS: 2 REF: 012022ai NAT: S.ID.A.1

TOP: Dot Plots

210 ANS: 1 PTS: 2 REF: 082208ai NAT: A.SSE.A.1

TOP: Modeling Expressions

211 ANS: 1 PTS: 2 REF: 012011ai NAT: A.REI.D.10

TOP: Identifying Solutions

212 ANS: 2

$$6(3x - y = 7)$$

$$2(2x + 3y = 12)$$

PTS: 2 REF: 012020ai NAT: A.REI.C.6 TOP: Solving Linear Systems

213 ANS:

translate 2 left

PTS: 2 REF: 082230ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions

214 ANS:

$$4l + 8m = 40 \text{ No, since } 5(5.5) + 2(2.25) \neq 28 \quad 4l + 8m = 40 \quad 4(4.5) + 8m = 40$$

$$5l + 2m = 28$$

$$\underline{20l + 8m = 112}$$

$$8m = 22$$

$$16l = 72$$

$$m = 2.75$$

$$l = 4.5$$

PTS: 6 REF: 062137ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

215 ANS: 1

$$3(x + 4) - (2x + 7) = 3x + 12 - 2x - 7 = x + 5$$

PTS: 2 REF: 062102ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: subtraction

216 ANS: 1 PTS: 2 REF: 062222ai NAT: N.Q.A.1  
TOP: Conversions KEY: dimensional analysis

217 ANS: 3 PTS: 2 REF: 062119ai NAT: S.ID.A.1  
TOP: Box Plots KEY: interpret

218 ANS:

$$x^2(x^2 - 36) = x^2(x + 6)(x - 6)$$

PTS: 2 REF: 062231ai NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares KEY: higher power

219 ANS:

The product is irrational because  $\sqrt{27}$  can not be written as the ratio of two integers.

PTS: 2 REF: 012030ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

220 ANS: 3

$$\text{Maximum of } f(x) = 5 \quad \text{Maximum of } h(x) = 4 \quad \text{Maximum of } g(x) = 5 \quad j(x) = -\frac{1}{2}x^2 + x + 4$$

$$x = \frac{-1}{2\left(-\frac{1}{2}\right)} = 1$$

$$j(1) = -\frac{1}{2}(1)^2 + 1 + 4 = 4\frac{1}{2}$$

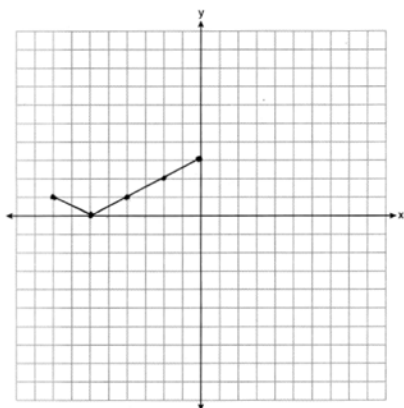
PTS: 2 REF: 062219ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

221 ANS: 2

1) 1; 2) -3; 3) -2; 4) -1

PTS: 2 REF: 082214ai NAT: F.IF.C.9 TOP: Comparing Functions

222 ANS:



PTS: 2 REF: 062126ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

223 ANS: 3

$$y = 4^x$$

PTS: 2 REF: 062208ai NAT: F.LE.A.1 TOP: Families of Functions

224 ANS: 3

$$18x^2 - 50 = 2(9x^2 - 25) = 2(3x - 5)(3x + 5)$$

PTS: 2 REF: 012006ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

225 ANS: 3

PTS: 2

REF: 062209ai

NAT: A.APR.A.1

TOP: Powers of Powers

226 ANS: 4

PTS: 2

REF: 062104ai

NAT: F.IF.A.1

TOP: Defining Functions

KEY: ordered pairs

227 ANS:

Rational, as  $\sqrt{1024} \cdot -3.4 = 32 \cdot -3.4 = -108.8$ , which is the ratio of two integers,  $\frac{-1088}{10}$ .

PTS: 2 REF: 062225ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

228 ANS: 2

$$\frac{44 + 30}{32 + 44 + 24 + 36 + 30 + 34} = 37\%$$

PTS: 2 REF: 082212ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

229 ANS: 2

PTS: 2

REF: 082213ai

NAT: F.LE.A.1

TOP: Families of Functions

230 ANS:

Domain is reals. Range is  $y \geq 3$ .

PTS: 2 REF: 062229ai NAT: F.IF.B.5 TOP: Domain and Range

KEY: graph

- 231 ANS: 3                      PTS: 2                      REF: 062110ai                      NAT: A.SSE.A.2  
TOP: Factoring Polynomials                      KEY: quadratic
- 232 ANS:  
 $6x^2 - 6xy - (3x^2 - 6xy) = 3x^2$
- PTS: 2                      REF: 062228ai                      NAT: A.APR.A.1                      TOP: Operations with Polynomials  
KEY: subtraction
- 233 ANS:  
112; (3,256); At  $t = 3$ , the ball is 256 ft high; 3-7 seconds
- PTS: 4                      REF: 062136ai                      NAT: F.IF.B.4                      TOP: Graphing Quadratic Functions  
KEY: key features
- 234 ANS:  
 $1.99x + 2.50(x + 2) + 2(2.99) \leq 25$       3 pounds of grapes  
 $1.99x + 2.50x + 5 + 5.98 \leq 25$   
 $4.49x \leq 14.02$   
 $x \leq \frac{1402}{449}$
- PTS: 4                      REF: 082235ai                      NAT: A.CED.A.1                      TOP: Modeling Linear Inequalities
- 235 ANS: 1  
 $r = -0.98$
- PTS: 2                      REF: 082223ai                      NAT: S.ID.C.8                      TOP: Correlation Coefficient
- 236 ANS: 2                      PTS: 2                      REF: 082221ai                      NAT: N.Q.A.1  
TOP: Conversions
- 237 ANS: 2                      PTS: 2                      REF: 062220ai                      NAT: A.SSE.A.1  
TOP: Modeling Expressions
- 238 ANS: 4  
 $3x - 24 + 4x = 8x + 4$   
 $7x - 24 = 8x + 4$   
 $-28 = x$
- PTS: 2                      REF: 062106ai                      NAT: A.REI.B.3                      TOP: Solving Linear Equations  
KEY: integral expressions
- 239 ANS:  
 $6.25a + 4.5(45) \leq 550$       55 shirts  
 $6.25a + 202.5 \leq 550$   
 $6.25a \leq 347.50$   
 $a \leq 55.6$
- PTS: 2                      REF: 012026ai                      NAT: A.CED.A.1                      TOP: Modeling Linear Inequalities

240 ANS:

$$w\left(\frac{1}{2}w + 6\right) = 432 \quad \frac{1}{2}w^2 + 6w = 432 \quad l = \frac{1}{2}(24) + 6 = 18$$

$$w^2 + 12w - 864 = 0$$

$$(w - 24)(w + 36) = 0$$

$$w = 24$$

PTS: 4 REF: 012036ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

241 ANS: 4 PTS: 2 REF: 012007ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

242 ANS: 2

$$K(-3) = 2(-3)^2 - 5(-3) + 3 = 18 + 15 + 3 = 36$$

PTS: 2 REF: 062103ai NAT: F.IF.A.2 TOP: Functional Notation

243 ANS: 2 PTS: 2 REF: 062201ai NAT: S.ID.C.9

TOP: Analysis of Data

244 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.

PTS: 4 REF: 062233ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

245 ANS: 2

$$v^2 - u^2 = 2as$$

$$\frac{v^2 - u^2}{2s} = \frac{2as}{2s}$$

$$\frac{v^2 - u^2}{2s} = a$$

PTS: 2 REF: 012408ai NAT: A.CED.A.4 TOP: Transforming Formulas

246 ANS: 2

$$f(2) = 2(3^2) + 1 = 19$$

PTS: 2 REF: 012001ai NAT: F.IF.A.2 TOP: Functional Notation

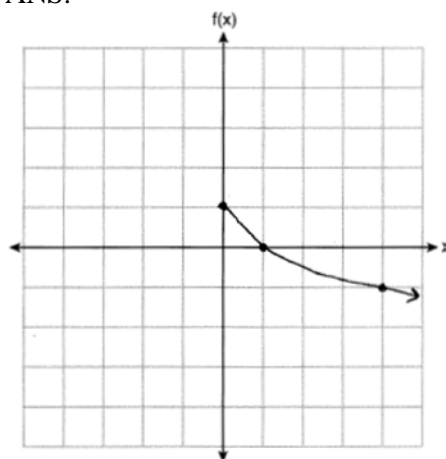
247 ANS: 4

$$\frac{67}{42 + 67} \approx 0.615$$

PTS: 2 REF: 012409ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

248 ANS:



PTS: 2 REF: 012025ai NAT: F.IF.C.7 TOP: Graphing Root Functions

249 ANS: 3

$$(x + 4)^2 = 9$$

$$x + 4 = \pm 3$$

$$x = -1, -7$$

PTS: 2 REF: 012015ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

250 ANS: 3 PTS: 2 REF: 062210ai NAT: F.IF.A.1

TOP: Defining Functions

KEY: mixed

251 ANS: 3

	Donna	Andrew
mean	91.6	89.6
median	92	93
IQR	6	12.5
3rd Q	94.5	95

PTS: 2 REF: 062214ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

252 ANS: 4 PTS: 2 REF: 062117ai NAT: F.LE.A.1

TOP: Families of Functions

253 ANS: 3

$$(2\sqrt{8})(3\sqrt{2}) = 6\sqrt{16} = 24$$

PTS: 2 REF: 062109ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

254 ANS: 4 PTS: 2 REF: 082219ai NAT: A.REI.A.1

TOP: Identifying Properties

255 ANS: 3 PTS: 2 REF: 062114ai NAT: A.APR.A.1

TOP: Powers of Powers

## Algebra I Regents at Random Worksheets

### Answer Section

256 ANS: 2

$$\frac{26}{42+26} = 0.382$$

PTS: 2 REF: 061912ai NAT: S.ID.B.5 TOP: Frequency Tables  
KEY: two-way

257 ANS: 4

$$f(4) = q(4) = p(4) = 3$$

PTS: 2 REF: 011921ai NAT: F.IF.C.9 TOP: Comparing Functions

258 ANS:

4th because IQR and  $\sigma_x$  are greater for 4th Period.

PTS: 2 REF: 081831ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

259 ANS:

$y = 7.79x + 34.27$   $r = 0.98$  high, positive correlation between hours spent studying and test scores

PTS: 4 REF: 061935ai NAT: S.ID.B.6 TOP: Regression  
KEY: linear with correlation coefficient

260 ANS: 1

PTS: 2 REF: 061922ai NAT: S.ID.A.2  
TOP: Dispersion KEY: basic

261 ANS:

No. The product of  $\sqrt{8}$  and  $\sqrt{2}$ , which are both irrational numbers, is  $\sqrt{16}$ , which is rational.

PTS: 2 REF: 081930ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

262 ANS: 4

$$\frac{2}{3} \left( \frac{1}{4}x - 2 \right) = \frac{1}{5} \left( \frac{4}{3}x - 1 \right)$$

$$10(3x - 24) = 3(16x - 12)$$

$$30x - 240 = 48x - 36$$

$$-204 = 18x$$

$$x = -11.\bar{3}$$

PTS: 2 REF: 011822ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
KEY: fractional expressions

263 ANS:

Rational, as  $\sqrt{16} \cdot \frac{4}{7} = \frac{16}{7}$ , which is the ratio of two integers.

PTS: 2 REF: 061831ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify



264 ANS: 1

$$2(3x^3 + 2x^2 - 17)$$

PTS: 2

REF: 081813ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: addition

265 ANS: 1

$$\frac{58 + 41}{42 + 58 + 20 + 84 + 41 + 5} = \frac{99}{250} = 0.396$$

PTS: 2

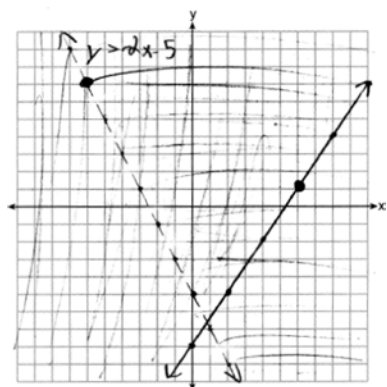
REF: 061809ai

NAT: S.ID.B.5

TOP: Frequency Tables

KEY: two-way

266 ANS:



(6, 1) is on a solid line. (-6, 7) is on a dashed line.

PTS: 4

REF: 081835ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

KEY: graph

267 ANS:

$$\frac{2}{3} < \frac{x}{5}$$

$$\frac{10}{3} < x$$

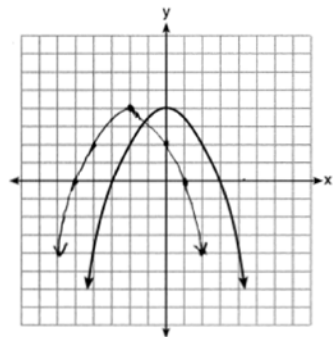
PTS: 2

REF: 081929ai

NAT: A.REI.B.3

TOP: Solving Linear Inequalities

268 ANS:



PTS: 2

REF: 061828ai

NAT: F.BF.B.3

TOP: Transformations with Functions

269 ANS: 4

$$P(c) = (.50 + .25)c - 9.96 = .75c - 9.96$$

PTS: 2 REF: 011807ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

270 ANS: 1 PTS: 2 REF: 011803ai NAT: A.CED.A.3

TOP: Modeling Linear Systems

271 ANS:

$$9K = 5F + 2298.35$$

$$F = \frac{9K - 2298.35}{5}$$

PTS: 2 REF: 081829ai NAT: A.CED.A.4 TOP: Transforming Formulas

272 ANS: 1

$$x - 4y = -10 \quad x + 3 = 5 \quad 5x = 10 \quad 2 + y = 5$$

$$\underline{x + y = 5} \quad x = 2 \quad x = 2 \quad y = 3$$

$$-5y = -15$$

$$y = 3$$

PTS: 2 REF: 081922ai NAT: A.REI.C.6 TOP: Solving Linear Systems

273 ANS: 2

$$1) x = \frac{-2}{2(1)} = -1, h(-1) = (-1)^2 + 2(-1) - 6 = -7; 2) y = -10; 3) k \left( \frac{-5 + -2}{2} \right) = (-3.5 + 5)(-3.5 + 2) = -2.25; 4)$$

$$y = -6$$

PTS: 2 REF: 061813ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

274 ANS:

$$2L + 1.5W \geq 500 \quad 2(144) + 1.5W = 500 \quad 142 \text{ bottles of water must be sold to cover the cost of renting costumes.}$$

$$L + W \leq 360 \quad 1.5W = 212$$

$$W = 141.\bar{3}$$

PTS: 4 REF: 011835ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

275 ANS:

$$6x^2 = 42$$

$$x^2 = 7$$

$$x = \pm\sqrt{7}$$

PTS: 2 REF: 081931ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

276 ANS: 3

$$l(w) = 3.1w - 16.2, l(10) = 3.1(10) - 16.2 = 14.8, l(13) = 3.1(13) - 16.2 = 24.1; p(w) = 2.5(1.52)^{w-6},$$

$$p(10) = 2.5(1.52)^{10-6} \approx 13.3, p(13) = 2.5(1.52)^{13-6} \approx 46.9$$

PTS: 2 REF: 011916ai NAT: F.LE.A.3 TOP: Families of Functions

277 ANS:

$y = -7.76x + 246.34, -0.88$  As the distance from Times Square increases, the cost of a room decreases.

PTS: 4 REF: 081935ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

278 ANS:

Linear, because the function grows at a constant rate.

$$\frac{435 - 348}{14 - 13} = \frac{522 - 435}{15 - 14} = \frac{609 - 522}{16 - 15} = \frac{696 - 609}{17 - 16} = \frac{783 - 696}{18 - 17} = \frac{87}{1}$$

PTS: 2 REF: 011926ai NAT: F.LE.A.1 TOP: Families of Functions

279 ANS: 3 PTS: 2 REF: 011820ai NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities KEY: solution set

280 ANS: 1

$$h(t) = 0$$

$$-16t^2 + 64t + 80 = 0$$

$$t^2 - 4t - 5 = 0$$

$$(t - 5)(t + 1) = 0$$

$$t = 5, -1$$

PTS: 2 REF: 081910ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: key features

281 ANS: 4

$$4p + 2 < 2p + 10$$

$$2p < 8$$

$$p < 4$$

PTS: 2 REF: 061801ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

282 ANS: 1

$$\sqrt{2} \cdot \sqrt{18} = \sqrt{36} = \frac{6}{1} \text{ may be expressed as the ratio of two integers.}$$

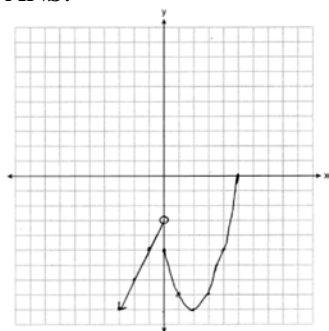
PTS: 2 REF: 061907ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

283 ANS: 2 PTS: 2 REF: 061904ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

284 ANS:



PTS: 2 REF: 081932ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

285 ANS: 3

$$f(-2) = 0, f(3) = 10, f(5) = 42$$

PTS: 2 REF: 011812ai NAT: F.IF.A.2 TOP: Domain and Range

KEY: limited domain

286 ANS:

$2 < t < 6$  and  $14 < t < 15$  because horizontal lines have zero slope.

PTS: 2 REF: 011928ai NAT: F.IF.B.6 TOP: Rate of Change

287 ANS: 4

$$\frac{3}{2} \left( \frac{2}{3} (3 - 2x) = \frac{3}{4} \right)$$

$$3 - 2x = \frac{9}{8}$$

$$24 - 16x = 9$$

$$15 = 16x$$

$$x = \frac{15}{16}$$

PTS: 2 REF: 012416ai NAT: A.REI.B.3 TOP: Solving Linear Equations

288 ANS: 3

$$y = (-1)^2 - 3(-1) - 2 = 2, y = 4(-1) + 6 = 2$$

PTS: 2 REF: 011918ai NAT: A.REI.D.11 TOP: Other Systems

289 ANS:  
 $18 - 2(x + 5) = 12x$

$$18 - 2x - 10 = 12x$$

$$8 = 14x$$

$$x = \frac{8}{14} = \frac{4}{7}$$

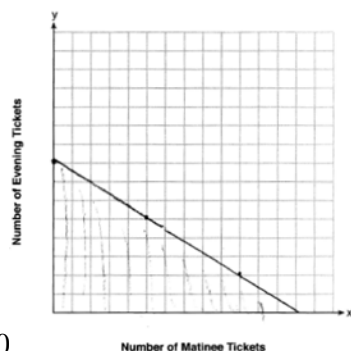
PTS: 3 REF: 061830ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
 KEY: fractional expressions

290 ANS: 3 PTS: 2 REF: 011809ai NAT: A.SSE.A.2  
 TOP: Factoring the Difference of Perfect Squares KEY: higher power

291 ANS: 2 PTS: 2 REF: 081907ai NAT: F.LE.A.1  
 TOP: Families of Functions

292 ANS: 1 PTS: 2 REF: 011906ai NAT: A.SSE.A.2  
 TOP: Factoring Polynomials KEY: quadratic

293 ANS:



$7.5x + 12.5y \leq 100$  13, because  $7.5(13) \leq 100$  and  $7.5(14) > 100$ .

PTS: 4 REF: 011935ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

294 ANS:  
 $3600 + 1.02x < 2000 + 1.04x$

$$1600 < 0.02x$$

$$80000 < x$$

PTS: 2 REF: 011925ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

295 ANS:  
 Commutative. This property is correct because  $x + y = y + x$ .

PTS: 2 REF: 081926ai NAT: A.REI.A.1 TOP: Identifying Properties

296 ANS: 1  
 $3(10) + 2 \neq (-2)^2 - 5(-2) + 17$

$$32 \neq 31$$

PTS: 2 REF: 081818ai NAT: A.REI.D.10 TOP: Identifying Solutions

297 ANS: 3 PTS: 2 REF: 081803ai NAT: A.SSE.A.2  
 TOP: Factoring Polynomials KEY: quadratic

298 ANS: 1

$$\text{I. } 10 \text{ mi} \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) = 16.09 \text{ km}; \text{ II. } 44880 \text{ ft} \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) \approx 13.6765 \text{ km}; \text{ III.}$$

$$15560 \text{ yd} \left( \frac{3 \text{ ft}}{1 \text{ yd}} \right) \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) \approx 14.225 \text{ km}$$

PTS: 2                      REF: 061815ai                      NAT: N.Q.A.1                      TOP: Conversions  
KEY: dimensional analysis

299 ANS:

$$x^2 - 4x + 3 = 0$$

$$(x - 3)(x - 1) = 0$$

$$x = 1, 3$$

PTS: 2                      REF: 011826ai                      NAT: A.APR.B.3                      TOP: Zeros of Polynomials

300 ANS:

III and IV are functions. I, for  $x = 6$ , has two  $y$ -values. II, for  $x = 1, 2$ , has two  $y$ -values.

PTS: 2                      REF: 081826ai                      NAT: F.IF.A.1                      TOP: Defining Functions  
KEY: graphs

301 ANS: 1

$$(x^2 + 3x + 9)(x - 3) = x^3 - 3x^2 + 3x^2 - 9x + 9x - 27 = x^3 - 27$$

PTS: 2                      REF: 012415ai                      NAT: A.APR.A.1                      TOP: Operations with Polynomials  
KEY: multiplication

302 ANS: 3

$$p(x) = x^2 - 2x - 24 = (x - 6)(x + 4) = 0$$

$$x = 6, -4$$

PTS: 2                      REF: 061804ai                      NAT: A.APR.B.3                      TOP: Zeros of Polynomials

303 ANS:

$$V = 450(1.025)^t; \text{ No, } 450(1.025)^{20} < 2 \cdot 450$$

PTS: 4                      REF: 011933ai                      NAT: A.CED.A.1                      TOP: Modeling Exponential Functions

304 ANS: 2                      PTS: 2                      REF: 011804ai                      NAT: F.IF.A.1  
TOP: Defining Functions                      KEY: graphs

305 ANS: 2                      PTS: 2                      REF: 081809ai                      NAT: A.CED.A.3  
TOP: Modeling Linear Systems

306 ANS: 4

II is linear.

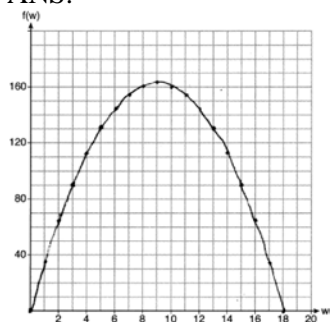
PTS: 2                      REF: 081823ai                      NAT: F.LE.A.1                      TOP: Families of Functions

307 ANS: 4                      PTS: 2                      REF: 061823ai                      NAT: A.CED.A.4  
TOP: Transforming Formulas

308 ANS: 1                      PTS: 2                      REF: 061906ai                      NAT: F.LE.A.1  
TOP: Families of Functions

- 309 ANS: 2  
 $f(-2) = f(-1) = -16, f(0) = -12, f(1) = -4$
- PTS: 2 REF: 011914ai NAT: F.IF.A.2 TOP: Domain and Range  
 KEY: limited domain
- 310 ANS: 1  
 $x^2 + 8x = 33$   
 $x^2 + 8x + 16 = 33 + 16$   
 $(x + 4)^2 = 49$
- PTS: 2 REF: 011915ai NAT: A.REI.B.4 TOP: Solving Quadratics  
 KEY: completing the square
- 311 ANS: 3 PTS: 2 REF: 061917ai NAT: A.SSE.A.2  
 TOP: Factoring Polynomials KEY: quadratic
- 312 ANS: 4  
 $2(x^2 - 1) + 3x(x - 4) = 2x^2 - 2 + 3x^2 - 12x = 5x^2 - 12x - 2$
- PTS: 2 REF: 081903ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
 KEY: addition
- 313 ANS: 2  
 $-4.9(0)^2 + 50(0) + 2$
- PTS: 2 REF: 011811ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
 KEY: key features
- 314 ANS: 2  
 $3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5) = 3x^2 + 6x - 9 - 16x^2 + 28x - 20 = -13x^2 + 34x - 29$
- PTS: 2 REF: 061803ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
 KEY: subtraction
- 315 ANS:  
 $f(x) = (x^2 - 2x + 1) - 8 - 1 = (x - 1)^2 - 9 \quad (1, -9)$
- PTS: 2 REF: 061932ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

316 ANS:

If the garden's width is 9 ft, its area is 162 ft<sup>2</sup>.

PTS: 4 REF: 081836ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: graph

317 ANS: 4

$$a + 7b > -8b$$

$$a > -15b$$

PTS: 2 REF: 061913ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

318 ANS:

Graph  $f(x)$  and find  $x$ -intercepts,  $-3, 1, 8$ .

PTS: 2 REF: 081825ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

319 ANS: 3

$$10.25 \neq 3(1.25)^2 - 1.25 + 7$$

PTS: 2 REF: 061918ai NAT: A.REI.D.10 TOP: Identifying Solutions

320 ANS: 3

PTS: 2

REF: 081901ai

NAT: A.SSE.A.1

TOP: Modeling Expressions

321 ANS: 1

PTS: 2

REF: 081918ai

NAT: F.IF.B.4

TOP: Relating Graphs to Events

322 ANS: 4

$$2x - 7 > 2.5x + 3$$

$$-10 > 0.5x$$

$$-20 > x$$

PTS: 2 REF: 012418ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

323 ANS: 2

PTS: 2

REF: 081810ai

NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

324 ANS:

$$135 + 72x \geq 580$$

$$72x \geq 445$$

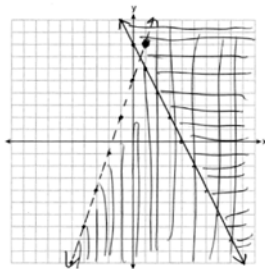
$$x \geq 6.2$$

PTS: 4 REF: 081833ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities



325 ANS: 2                      PTS: 2                      REF: 081817ai                      NAT: F.LE.B.5  
TOP: Modeling Linear Functions

326 ANS:



No,  $(1, 8)$  falls on the boundary line of  $y - 5 < 3x$ , which is a strict inequality.

PTS: 4                      REF: 081933ai                      NAT: A.REI.D.12                      TOP: Graphing Systems of Linear Inequalities  
KEY: graph

327 ANS:

$y < -3x + 3$  Region A represents the solution set of the system. The gray region represents the solution set of

$$y \leq 2x - 2$$

$$y \leq 2x - 2.$$

PTS: 4                      REF: 061936ai                      NAT: A.CED.A.3                      TOP: Modeling Systems of Linear Inequalities  
328 ANS: 4                      PTS: 2                      REF: 011908ai                      NAT: A.REI.A.1  
TOP: Identifying Properties

329 ANS: 2                      PTS: 2                      REF: 081806ai                      NAT: F.IF.A.2  
TOP: Domain and Range                      KEY: limited domain

330 ANS: 3                      PTS: 2                      REF: 061911ai                      NAT: F.LE.A.1  
TOP: Families of Functions

331 ANS:

$$b = 4s + 6 \quad 4s + 6 - 3 = 7s - 21 \quad b = 4(8) + 6 = 38 \quad 38 + x = 3(8 + x)$$

$$b - 3 = 7(s - 3) \quad 3s = 24 \quad x + 38 = 24 + 3x$$

$$s = 8$$

$$2x = 14$$

$$x = 7$$

PTS: 6                      REF: 081837ai                      NAT: A.CED.A.3                      TOP: Modeling Linear Systems  
332 ANS: 3                      PTS: 2                      REF: 012017ai                      NAT: F.LE.A.1  
TOP: Families of Functions

333 ANS: 2

From 1996-2012, the average rate of change was positive for three age groups.

PTS: 2                      REF: 011824ai                      NAT: F.IF.B.6                      TOP: Rate of Change  
334 ANS: 3                      PTS: 2                      REF: 081908ai                      NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares                      KEY: quadratic

335 ANS: 4

$$x = \frac{-(-2)}{2(2)} = 0.5 \quad h(0.5) = -4.5$$

PTS: 2      REF: 081923ai      NAT: F.IF.A.2      TOP: Domain and Range  
KEY: real domain, quadratic

336 ANS: 3      PTS: 2      REF: 011909ai      NAT: A.REI.B.4

TOP: Solving Quadratics      KEY: graph

337 ANS: 2

$$\frac{60-45}{60} = \frac{15}{60} = \frac{1}{4}$$

PTS: 2      REF: 081814ai      NAT: S.ID.B.5      TOP: Frequency Tables  
KEY: two-way

338 ANS:

$$x = 1 \quad \frac{-3+5}{2} = 1$$

PTS: 2      REF: 011829ai      NAT: F.IF.C.7      TOP: Graphing Quadratic Functions  
KEY: key features

339 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).

PTS: 2      REF: 081811ai      NAT: F.IF.C.9      TOP: Comparing Functions

340 ANS: 4

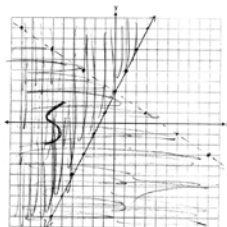
$$f(-1) = (-1)^2 - 3(-1) + 4 = 8$$

PTS: 2      REF: 061808ai      NAT: A.REI.D.10      TOP: Identifying Solutions

341 ANS: 4      PTS: 2      REF: 061901ai      NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares      KEY: higher power

342 ANS:



No, as  $2(0) + 3(3) = 9$ .

PTS: 4      REF: 062236ai      NAT: A.REI.D.12      TOP: Graphing Systems of Linear Inequalities

343 ANS: 1      PTS: 2      REF: 061806ai      NAT: A.CED.A.3

TOP: Modeling Linear Inequalities

344 ANS:

Irrational, as 89 is not a perfect square.  $3^2 - 4(2)(-10) = 89$

PTS: 2      REF: 081828ai      NAT: A.REI.B.4      TOP: Using the Discriminant

345 ANS: 4 PTS: 2 REF: 061814ai NAT: F.LE.A.1  
TOP: Families of Functions

346 ANS: 3 PTS: 2 REF: 081914ai NAT: A.REI.D.11  
TOP: Other Systems

347 ANS: 2  
 $-2 + 8x = 3x + 8$

$$5x = 10$$

$$x = 2$$

PTS: 2 REF: 081804ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
KEY: integral expressions

348 ANS: 1 PTS: 2 REF: 061905ai NAT: A.SSE.A.1  
TOP: Modeling Expressions

349 ANS: 2

1)  $x = \frac{-2}{2(-1)} = 1$  ; 2)  $h = \frac{3}{2}$  Using (0,3),  $3 = a\left(0 - \frac{3}{2}\right)^2 + k$ ; Using (1,5),  $5 = a\left(1 - \frac{3}{2}\right)^2 + k$

$$y = -1^2 + 2(1) + 4 = 5$$

vertex (1,5)

$$3 = \frac{9}{4}a + k$$

$$5 = \frac{1}{4}a + k$$

$$k = 3 - \frac{9}{4}a$$

$$k = 5 - \frac{1}{4}a$$

$5 - \frac{1}{4}a = 3 - \frac{9}{4}a$   $k = 5 - \frac{1}{4}(-1) = \frac{21}{4}$ ; 3) vertex (5,5); 4) Using  $c = 1$   $-9 = (-2)^2a + (-2)b + 1$

$$20 - a = 12 - 9a \quad \text{vertex} \left( \frac{3}{2}, \frac{21}{4} \right)$$

$$8a = -8$$

$$a = -1$$

$$-10 = 4a - 2b$$

$$b = 2a + 5$$

$$-3 = (-1)^2a + (-1)b + 1 \quad 2a + 5 = a + 4 \quad x = \frac{-3}{2(-1)} = \frac{3}{2} \quad \text{vertex} \left( \frac{3}{2}, \frac{13}{4} \right)$$

$$-3 = a - b + 1 \quad a = -1$$

$$b = a + 4 \quad b = -1 + 4 = 3 \quad y = -\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) + 1 = -\frac{9}{4} + \frac{18}{4} + \frac{4}{4} = \frac{13}{4}$$

PTS: 2 REF: 011823ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions  
350 ANS: 1

$$y = x^2 + 24x + 144 - 18 - 144$$

$$y = (x + 12)^2 - 162$$

PTS: 2 REF: 081911ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

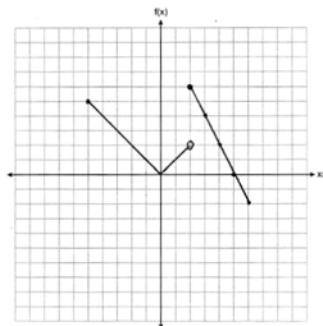
351 ANS:

$$x = \frac{-1 \pm \sqrt{1^2 - 4(1)(-5)}}{2(1)} = \frac{-1 \pm \sqrt{21}}{2} \approx -2.8, 1.8$$

PTS: 2 REF: 061827ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

352 ANS:



PTS: 2 REF: 061927ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

353 ANS: 1

$$5r = a_2 \quad a_2 r = 245 \quad 5r = \frac{245}{r}$$

$$a_2 = \frac{245}{r} \quad 5r^2 = 245$$

$$r^2 = 49$$

$$r = \pm 7$$

PTS: 2 REF: 081924ai NAT: F.IF.A.3 TOP: Sequences

KEY: difference or ratio

354 ANS: 1

$$\frac{91 \text{ cm}}{\text{day}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \approx \frac{1.49 \text{ in}}{\text{hr}}$$

PTS: 2 REF: 061924ai NAT: N.Q.A.1 TOP: Conversions

KEY: dimensional analysis

355 ANS: 4 PTS: 2 REF: 061909ai NAT: A.REI.A.1

TOP: Identifying Properties

356 ANS: 2

$$-2(x - 5) < 10$$

$$x - 5 > -5$$

$$x > 0$$

PTS: 2 REF: 011817ai NAT: A.REI.B.3 TOP: Interpreting Solutions

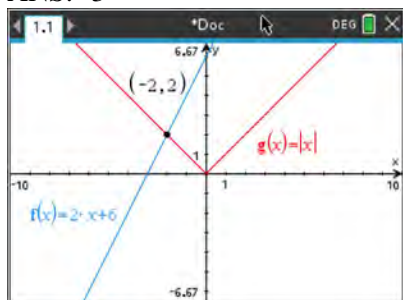
357 ANS: 3 PTS: 2 REF: 061817ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

- 358 ANS: 4                   PTS: 2                   REF: 061811ai           NAT: F.IF.A.1  
TOP: Defining Functions           KEY: ordered pairs
- 359 ANS: 2                   PTS: 2                   REF: 081801ai           NAT: A.SSE.B.3  
TOP: Modeling Exponential Functions
- 360 ANS: 2                   PTS: 2                   REF: 061915ai           NAT: A.CED.A.1  
TOP: Modeling Linear Equations
- 361 ANS: 4                   PTS: 2                   REF: 081820ai           NAT: F.BF.A.1  
TOP: Sequences           KEY: explicit
- 362 ANS:  
 $A(x) = 5x + 50$     $5x + 50 < 6x + 25$    26 shirts  
 $B(x) = 6x + 25$     $25 < x$
- PTS: 4                   REF: 061933ai           NAT: A.CED.A.3           TOP: Modeling Linear Inequalities
- 363 ANS:  
 $5x^2 = 180$   
 $x^2 = 36$   
 $x = \pm 6$
- PTS: 2                   REF: 061928ai           NAT: A.REI.B.4           TOP: Solving Quadratics  
KEY: taking square roots
- 364 ANS: 4                   PTS: 2                   REF: 011801ai           NAT: A.REI.A.1  
TOP: Identifying Properties
- 365 ANS: 4                   PTS: 2                   REF: 081902ai           NAT: F.IF.A.1  
TOP: Defining Functions           KEY: ordered pairs
- 366 ANS: 4                   PTS: 2                   REF: 012420ai           NAT: F.BF.A.1  
TOP: Modeling Exponential Functions
- 367 ANS: 3                   PTS: 2                   REF: 011813ai           NAT: A.APR.A.1  
TOP: Operations with Polynomials   KEY: addition
- 368 ANS: 3                   PTS: 2                   REF: 081808ai           NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions
- 369 ANS: 1  
 $h(0) = -4.9(0)^2 + 6(0) + 5 = 5$
- PTS: 2                   REF: 011913ai           NAT: F.IF.B.4           TOP: Graphing Quadratic Functions  
KEY: key features
- 370 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.
- PTS: 2                   REF: 011816ai           NAT: S.ID.A.3           TOP: Central Tendency and Dispersion

- 371 ANS:  
 $r \approx 0.92$ . The correlation coefficient suggests a strong positive correlation between a student's mathematics and physics scores.
- PTS: 2 REF: 011831ai NAT: S.ID.C.8 TOP: Correlation Coefficient
- 372 ANS: 3  
 $\frac{5.4-4}{4} = 0.35$
- PTS: 2 REF: 011802ai NAT: F.LE.A.2 TOP: Modeling Exponential Functions
- 373 ANS: 2  
 $f(-3) = -12 + 5 = -7$
- PTS: 2 REF: 061902ai NAT: F.IF.A.2 TOP: Functional Notation
- 374 ANS:  
 $x^2 + 4x + 4 = 2 + 4$   
 $(x+2)^2 = 6$   
 $x+2 = \pm\sqrt{6}$   
 $x = -2 \pm \sqrt{6}$
- PTS: 2 REF: 081830ai NAT: A.REI.B.4 TOP: Solving Quadratics  
 KEY: completing the square
- 375 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.
- PTS: 4 REF: 011834ai NAT: S.ID.B.6 TOP: Regression  
 KEY: linear
- 376 ANS: 4  
 $1000(0.5)^{2t} = 1000(0.5^2)^t = 1000(0.25)^t$
- PTS: 2 REF: 011923ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions
- 377 ANS: 4  
 Time is continuous and positive.
- PTS: 2 REF: 081921ai NAT: F.IF.B.5 TOP: Domain and Range  
 KEY: context

378 ANS: 3



PTS: 2 REF: 012417ai NAT: A.REI.D.11 TOP: Other Systems

379 ANS: 4 PTS: 2 REF: 011821ai NAT: A.SSE.B.3  
TOP: Modeling Exponential Functions380 ANS: 2 PTS: 2 REF: 081816ai NAT: A.APR.B.3  
TOP: Zeros of Polynomials

381 ANS: 1

$$d = \frac{37-31}{6-3} = 2 \quad a_n = 2n + 25$$

$$a_{20} = 2(20) + 25 = 65$$

PTS: 2 REF: 061807ai NAT: F.BF.A.1 TOP: Sequences

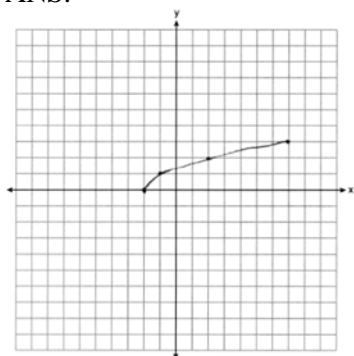
KEY: explicit

382 ANS: 3

The minimum of  $r(x)$  is  $-16$ . The minimum of  $q(x)$  is  $-9 \left( x = \frac{-2}{2(1)} = -1, q(-1) = -9 \right)$ .

PTS: 2 REF: 081917ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

383 ANS:

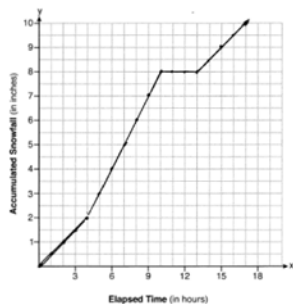


PTS: 2 REF: 061825ai NAT: F.IF.C.7 TOP: Graphing Root Functions

384 ANS: 1 PTS: 2 REF: 081805ai NAT: F.IF.A.2

TOP: Functional Notation

385 ANS:



$$\frac{10.0 - 0}{17.0 - 0} \approx 0.59$$

PTS: 4 REF: 081936ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

386 ANS: 2 PTS: 2 REF: 061821ai NAT: F.IF.B.5  
TOP: Domain and Range KEY: context387 ANS: 3 PTS: 2 REF: 061816ai NAT: F.IF.A.2  
TOP: Domain and Range KEY: real domain, quadratic

388 ANS:

$y = 1.9x + 29.8$   $r = 0.3$  This indicates a weak relationship between a dog's height and mass.

PTS: 4 REF: 011934ai NAT: S.ID.B.6 TOP: Regression  
KEY: linear with correlation coefficient

389 ANS:

$10d + 25q = 1755$ ,  $10(90 - q) + 25q = 1755$ , no, because  $20.98 \cdot 1.08 > 90 \cdot 0.25$

$$d + q = 90 \quad 900 - 10q + 25q = 1755$$

$$15q = 855$$

$$q = 57$$

PTS: 6 REF: 061837ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

390 ANS: 3

$$x^2 - 6x = 12$$

$$x^2 - 6x + 9 = 12 + 9$$

$$(x - 3)^2 = 21$$

PTS: 2 REF: 061812ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: completing the square391 ANS: 3 PTS: 2 REF: 081807ai NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares KEY: quadratic392 ANS: 2 PTS: 2 REF: 061923ai NAT: F.LE.B.5  
TOP: Modeling Exponential Functions393 ANS: 2 PTS: 2 REF: 011819ai NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions



394 ANS: 2

$$P = I^2 R$$

$$I^2 = \frac{P}{R}$$

$$I = \sqrt{\frac{P}{R}}$$

PTS: 2 REF: 011920ai NAT: A.CED.A.4 TOP: Transforming Formulas

395 ANS: 2 PTS: 2 REF: 011815ai NAT: A.REI.C.6

TOP: Solving Linear Systems

396 ANS: 4 PTS: 2 REF: 061903ai NAT: F.IF.A.1

TOP: Defining Functions KEY: mixed

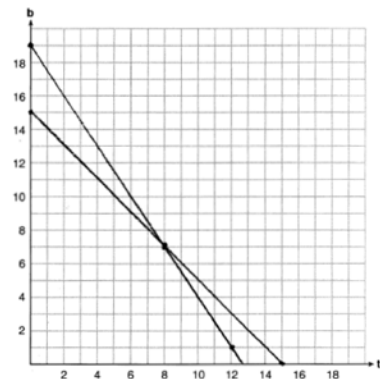
397 ANS: 3

$$2a^2 - 5 - 2(3 - a) = 2a^2 - 5 - 6 + 2a = 2a^2 + 2a - 11$$

PTS: 2 REF: 011911ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

398 ANS:



$t + b = 15$  No, because according to the graph, 8 tricycles were ordered.

$$3t + 2b = 38$$

PTS: 6 REF: 011937ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

399 ANS: 3

$$b^2 - 4ac = 2^2 - 4(4)(5) = -76$$

PTS: 2 REF: 061822ai NAT: A.REI.B.4 TOP: Using the Discriminant

400 ANS: 3 PTS: 2 REF: 081821ai NAT: S.ID.C.9

TOP: Analysis of Data

401 ANS: 2

$$w(w + 7) = w^2 + 7w$$

PTS: 2 REF: 081920ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

402 ANS: 1  
 $C = 8x^3y^5$

PTS: 2 REF: 012419ai NAT: A.APR.A.1 TOP: Powers of Powers

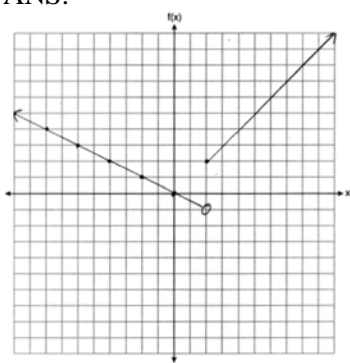
403 ANS:

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.

PTS: 4 REF: 011836ai NAT: F.IF.B.6 TOP: Rate of Change

404 ANS: 3 PTS: 2 REF: 061819ai NAT: A.SSE.A.1  
 TOP: Modeling Expressions

405 ANS:



PTS: 2 REF: 061832ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

406 ANS: 3  
 $\frac{4}{3} = \frac{x+10}{15}$

$$3x + 30 = 60$$

$$x = 10$$

PTS: 2 REF: 081904ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
 KEY: fractional expressions

407 ANS: 3

$$y = -3x - 4$$

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

PTS: 2 REF: 011922ai NAT: A.REI.C.6 TOP: Solving Linear Systems  
 KEY: substitution

408 ANS: 2 PTS: 2 REF: 061805ai NAT: S.ID.A.1

TOP: Box Plots KEY: interpret

409 ANS: 3 PTS: 2 REF: 081819ai NAT: A.REI.D.11

TOP: Other Systems

410 ANS: 3  
 $\sqrt{576} = 24$   $\sqrt{684} = 6\sqrt{19}$

PTS: 2 REF: 011808ai NAT: N.RN.B.3 TOP: Operations with Radicals  
 KEY: classify

411 ANS:  

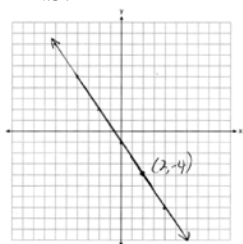
$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi r^2} = h$$

PTS: 2 REF: 061930ai NAT: A.CED.A.4 TOP: Transforming Formulas

412 ANS:



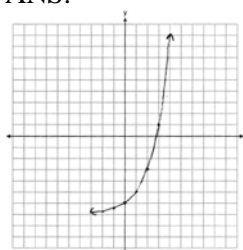
PTS: 2 REF: 081927ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

413 ANS: 1  
 $g(-3) = -2(-3)^2 + 3(-3) = -18 - 9 = -27$

PTS: 2 REF: 011902ai NAT: F.IF.A.2 TOP: Functional Notation

414 ANS: 1 PTS: 2 REF: 011805ai NAT: F.LE.A.1  
 TOP: Families of Functions

415 ANS:



Yes,  $f(4) > g(4)$  because  $2^4 - 7 > 1.5(4) - 3$ .

PTS: 2 REF: 011929ai NAT: F.IF.C.7 TOP: Graphing Exponential Functions

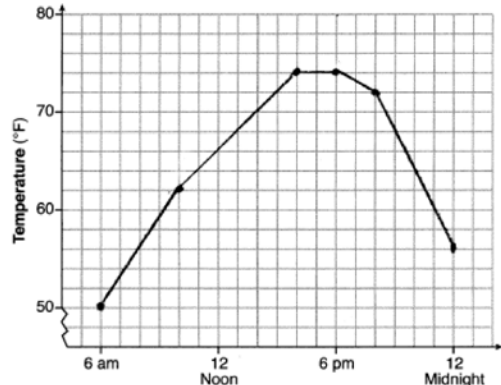
416 ANS:  
 $A(t) = 5000(1.012)^t$   $A(32) - A(17) \approx 1200$

PTS: 2 REF: 081934ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

417 ANS:  
Yes, because  $f(x)$  does not have a constant rate of change.

PTS: 2 REF: 061826ai NAT: F.LE.A.1 TOP: Families of Functions

418 ANS:



, 6am-4pm,  $\frac{74-56}{6-12} = -3$

PTS: 4 REF: 011936ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

419 ANS: 2

$$\frac{5 \pm \sqrt{(-5)^2 - 4(1)(-4)}}{2(1)} = \frac{5 \pm \sqrt{41}}{2}$$

PTS: 2 REF: 061921ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

420 ANS:

$d = 2c - 5$ ;  $20 \neq 2(15) - 5$  20 dogs is not five less than twice 15 cats  $\frac{c+3}{2c-5+3} = \frac{3}{4}$   $d = 2(9) - 5 = 13$

$$\frac{c+3}{d+3} = \frac{3}{4} \quad 20 \neq 25$$

$$4c + 12 = 6c - 6$$

$$18 = 2c$$

$$c = 9$$

PTS: 6 REF: 011837ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

421 ANS:

$$4x^2 = 80$$

$$x^2 = 20$$

$$x = \pm\sqrt{20}$$

PTS: 2 REF: 011932ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

422 ANS: 3 PTS: 2 REF: 061820ai NAT: F.IF.C.9

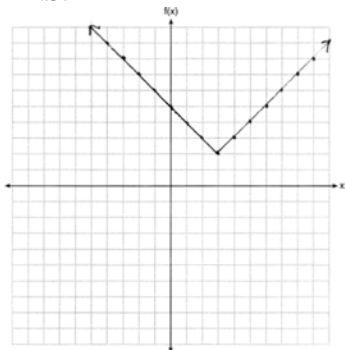
TOP: Comparing Functions

423 ANS: 1 PTS: 2 REF: 061810ai NAT: A.SSE.A.2

TOP: Factoring Polynomials KEY: quadratic

424 ANS: 4                   PTS: 2                   REF: 081815ai           NAT: F.IF.C.7  
TOP: Graphing Piecewise-Defined Functions

425 ANS:



PTS: 2                   REF: 011825ai           NAT: F.IF.C.7           TOP: Graphing Absolute Value Functions  
426 ANS:

$\frac{33-1}{12-1} \approx 2.9$      $\frac{36-11}{15-6} \approx 2.8$  The interval 1 a.m. to 12 noon has the greater rate.

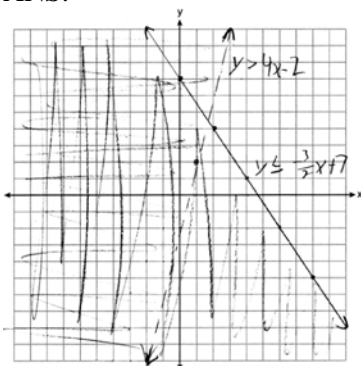
PTS: 2                   REF: 061929ai           NAT: F.IF.B.6           TOP: Rate of Change  
427 ANS: 4                   PTS: 2                   REF: 011912ai           NAT: F.LE.A.2  
TOP: Modeling Exponential Functions

428 ANS: 2

$$\frac{56}{56 + 74 + 103} \approx 0.24$$

PTS: 2                   REF: 081906ai           NAT: S.ID.B.5           TOP: Frequency Tables  
KEY: two-way

429 ANS:



(1,2) is not in the solution set since it does not fall in an area where the shadings overlap.

PTS: 4                   REF: 061835ai           NAT: A.REI.D.12       TOP: Graphing Systems of Linear Inequalities  
KEY: graph

430 ANS:

$$3.75A + 2.5D = 35 \quad 3.75(12 - D) + 2.5D = 35 \quad A + 8 = 12 \quad \frac{7((4)(2) + (8)(1))}{12} = 9\frac{1}{3} \quad 9 \cdot 2.5 = 22.50$$

$$A + D = 12 \quad 45 - 3.75D + 2.5D = 35 \quad A = 4$$

$$-1.25D = -10$$

$$D = 8$$

PTS: 6 REF: 081937ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

431 ANS:

$$x^2 - 8x - 9 = 0 \quad \text{I factored the quadratic.}$$

$$(x - 9)(x + 1) = 0$$

$$x = 9, -1$$

PTS: 2 REF: 011927ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

432 ANS:

$$-16t^2 + 256 = 0$$

$$16t^2 = 256$$

$$t^2 = 16$$

$$t = 4$$

PTS: 2 REF: 061829ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: key features

433 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

PTS: 2 REF: 061914ai NAT: F.IF.C.9 TOP: Comparing Functions

434 ANS: 3

$$-x^3 + 10x^2 + 24x = -x(x^2 - 10x - 24) = -x(x + 2)(x - 12)$$

PTS: 2 REF: 012421ai NAT: A.SSE.A.2 TOP: Factoring Polynomials

435 ANS:

$$-12\left(-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2\right)$$

$$8(x+12) - 8x = 15x - 24$$

$$8x + 96 - 8x = 15x - 24$$

$$120 = 15x$$

$$8 = x$$

PTS: 2 REF: 061925ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
KEY: fractional expressions

436 ANS:

$$V(t) = 25000(0.815)^t \quad V(3) - V(4) \approx 2503.71$$

PTS: 4 REF: 081834ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

437 ANS:

$$F_g = \frac{GM_1M_2}{r^2}$$

$$r^2 = \frac{GM_1M_2}{F_g}$$

$$r = \sqrt{\frac{GM_1M_2}{F_g}}$$

PTS: 2 REF: 011830ai NAT: A.CED.A.4 TOP: Transforming Formulas

438 ANS: 1

$$3(x-4)^2 = 27$$

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

$$x-4 = \pm 3$$

$$x = 1, 7$$

PTS: 2 REF: 011814ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: taking square roots

439 ANS: 4

$$k(9) = 2(9)^2 - 3\sqrt{9} = 162 - 9 = 153$$

PTS: 2 REF: 061802ai NAT: F.IF.A.2 TOP: Functional Notation

440 ANS: 2 PTS: 2 REF: 061919ai NAT: F.IF.A.3

TOP: Sequences KEY: difference or ratio

441 ANS: 3  
 $2(x - y = 3)$   
 $2x - 2y = 6$

PTS: 2 REF: 081822ai NAT: A.REI.C.6 TOP: Solving Linear Systems

442 ANS:  
 $A(x) = 7 + 3(x - 2)$   $7 + 3(x - 2) = 6.50 + 3.25(x - 2)$   
 $B(x) = 3.25x$   $7 + 3x - 6 = 3.25x$   
 $1 = 0.25x$   
 $4 = x$

PTS: 4 REF: 061834ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

443 ANS: 1  
 $8 - 1 = 7$

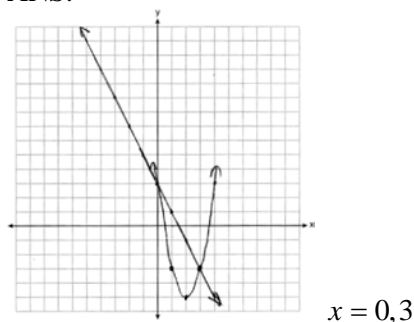
PTS: 2 REF: 081915ai NAT: S.ID.A.1 TOP: Box Plots  
 KEY: interpret

444 ANS:  
 Los Angeles because range, IQR and  $\sigma_x$  are less.

	$\sigma_x$	Min	Q1	Q3	Max	Range	IQR
<b>Miami</b>	7.2	60	75	83	87	27	8
<b>Los Angeles</b>	3.6	61	63	67	74	13	4

PTS: 2 REF: 011931ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

445 ANS:



PTS: 4 REF: 061934ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

446 ANS:  
 The rate of speed is expressed in  $\frac{\text{feet}}{\text{minute}}$  because speed =  $\frac{\text{distance}}{\text{time}}$ .

PTS: 2 REF: 011827ai NAT: A.CED.A.2 TOP: Speed

447 ANS: 4 PTS: 2 REF: 081909ai NAT: N.Q.A.1  
 TOP: Using Rate



448 ANS: 1

$$116(30) + 439L \leq 6500$$

$$439L \leq 3020$$

$$L \leq 6.879$$

PTS: 2 REF: 011904ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

449 ANS: 4 PTS: 2 REF: 011917ai NAT: F.IF.B.5

TOP: Domain and Range KEY: graph

450 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.

PTS: 2 REF: 011828ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: solution set

451 ANS: 1 PTS: 2 REF: 081802ai NAT: F.LE.A.1

TOP: Families of Functions

452 ANS:

$$\frac{3.41 - 6.26}{9 - 3} = -0.475$$

PTS: 2 REF: 081827ai NAT: F.IF.B.6 TOP: Rate of Change

453 ANS:

$$at = v_f - v_i$$

$$at + v_i = v_f$$

PTS: 2 REF: 081928ai NAT: A.CED.A.4 TOP: Transforming Formulas

454 ANS: 2 PTS: 2 REF: 011901ai NAT: S.ID.B.6

TOP: Scatter Plots KEY: line of best fit

455 ANS:

$$g(-2) = -4(-2)^2 - 3(-2) + 2 = -16 + 6 + 2 = -8$$

PTS: 2 REF: 081925ai NAT: F.IF.A.2 TOP: Functional Notation

456 ANS: 2

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

$$3 \left( x + \frac{4}{3} \right) = 5.2$$

$$3x + 4 = 5.2$$

$$3x = 1.2$$

$$x = 0.4$$

PTS: 2 REF: 011905ai NAT: A.REI.B.3 TOP: Solving Linear Equations

KEY: decimals

457 ANS: 3

$$(6x^2 + 2x)(5x - 6) = 30x^3 - 36x^2 + 10x^2 - 12x = 30x^3 - 26x^2 - 12x$$

PTS: 2 REF: 081824ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: multiplication

458 ANS:

There are 20 rabbits at  $x = 0$  and they are growing 1.4% per day.  $\frac{p(100) - p(50)}{100 - 50} \approx 0.8$

PTS: 2 REF: 061833ai NAT: F.IF.B.6 TOP: Rate of Change  
459 ANS: 3 PTS: 2 REF: 081812ai NAT: N.Q.A.1  
TOP: Conversions KEY: dimensional analysis

460 ANS: 4 PTS: 2 REF: 011907ai NAT: F.IF.A.1  
TOP: Defining Functions KEY: mixed

461 ANS:

$$C = 3x^2 + 4 - 3(2x^2 + 6x - 5) = 3x^2 + 4 - 6x^2 - 18x + 15 = -3x^2 - 18x + 19$$

PTS: 2 REF: 061926ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: subtraction

462 ANS: 2

$$(1.0005)^7 \approx 1.0035$$

PTS: 2 REF: 081913ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions  
463 ANS: 4 PTS: 2 REF: 011924ai NAT: N.Q.A.1  
TOP: Conversions KEY: dimensional analysis

464 ANS: 3

$$(2x + 3)(x + 4) = 2x^2 + 11x + 12$$

PTS: 2 REF: 081916ai NAT: A.SSE.A.2 TOP: Factoring Polynomials  
KEY: quadratic

465 ANS: 1

$$-5 - 2 = -7$$

PTS: 2 REF: 081905ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions  
466 ANS:

$$4c + 3f = 16.53 \text{ No, because } 5(2.49) + 4(2.87) \neq 21.11. \quad 16c + 12f = 66.12 \quad 4(2.79) + 3f = 16.53$$

$$5c + 4f = 21.11$$

$$\underline{15c + 12f = 63.33}$$

$$3f = 5.37$$

$$c = 2.79$$

$$f = 1.79$$

PTS: 6 REF: 061937ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

467 ANS: 4

$$-2 \neq (-1)^3 - (-1)$$

$$-2 \neq 0$$

PTS: 2 REF: 011806ai NAT: A.REI.D.10 TOP: Identifying Solutions

468 ANS: 3

$\sqrt{36} \div \sqrt{225} = \frac{6}{15}$  may be expressed as the ratio of two integers.

PTS: 2 REF: 011903ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

469 ANS:

$$p(x) = 0.035x + 300 \quad p(8250) = 0.035(8250) + 300 = 588.75$$

PTS: 4 REF: 011833ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

470 ANS: 4 PTS: 2 REF: 061920ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

471 ANS:

Yes, because from the graph the zeroes of  $f(x)$  are  $-2$  and  $3$ .

PTS: 2 REF: 011832ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions  
KEY: key features

472 ANS:

$$\frac{100 - 40}{4 - 1} = 20$$

PTS: 2 REF: 062227ai NAT: F.IF.B.6 TOP: Rate of Change

473 ANS: 2

$$(x^2 - 5x)(2x + 3) = 2x^3 + 3x^2 - 10x^2 - 15x = 2x^3 - 7x^2 - 15x$$

PTS: 2 REF: 081912ai NAT: A.SSE.A.1 TOP: Modeling Expressions

474 ANS: 3 PTS: 2 REF: 082209ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

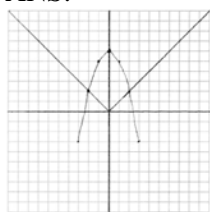
475 ANS: 2

$$\frac{Q}{mC} = T_f - T_i$$

$$\frac{Q}{mC} + T_i = T_f$$

PTS: 2 REF: 012318ai NAT: A.CED.A.4 TOP: Transforming Formulas

476 ANS:



Yes, because the graph of  $f(x)$  intersects the graph of  $g(x)$  at  $x = -2$ .

PTS: 4      REF: 011733ai      NAT: A.REI.D.11      TOP: Other Systems

477 ANS:

Yes, because the sequence has a common ratio, 3.

PTS: 2      REF: 081726ai      NAT: F.IF.A.3      TOP: Sequences

KEY: difference or ratio

## Algebra I Regents at Random Worksheets

## Answer Section

477 ANS: 4                      PTS: 2                      REF: 061703ai                      NAT: F.IF.C.7  
 TOP: Graphing Root Functions                      KEY: bimodalgraph

478 ANS:

$$V = \frac{1}{3} \pi r^2 h$$

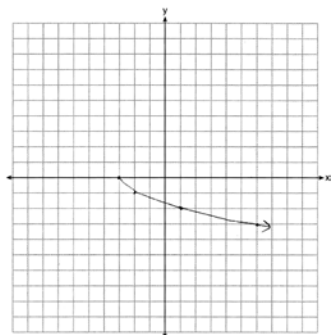
$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

PTS: 2                      REF: 081727ai                      NAT: A.CED.A.4                      TOP: Transforming Formulas

479 ANS:



PTS: 2                      REF: 081625ai                      NAT: F.IF.C.7                      TOP: Graphing Root Functions

480 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

$$t = 5 \quad -16t^2 + 64t + 80 = 0$$

$$t^2 - 4t - 5 = 0$$

$$(t - 5)(t + 1) = 0$$

$$t = 5$$

PTS: 4                      REF: 011633ai                      NAT: F.IF.B.4                      TOP: Graphing Quadratic Functions  
 KEY: key features

481 ANS: 2                      PTS: 2                      REF: 011611ai                      NAT: A.CED.A.1  
 TOP: Geometric Applications of Quadratics

482 ANS: 4                      PTS: 2                      REF: 081701ai                      NAT: A.REI.A.1  
 TOP: Identifying Properties

483 ANS: 4                      PTS: 2                      REF: 011621ai                      NAT: A.REI.C.6  
 TOP: Solving Linear Systems

484 ANS: 2

$$V = 15,000(0.81)^t = 15,000((0.9)^2)^t = 15,000(0.9)^{2t}$$

PTS: 2 REF: 081716ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

485 ANS: 1

$$2x^2 - 4x - 6 = 0$$

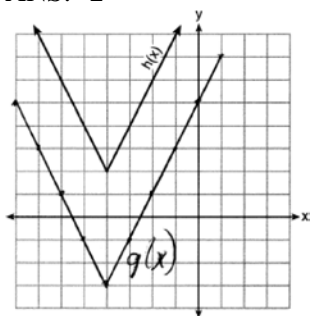
$$2(x^2 - 2x - 3) = 0$$

$$2(x - 3)(x + 1) = 0$$

$$x = 3, -1$$

PTS: 2 REF: 011609ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

486 ANS: 2



PTS: 2 REF: 081718ai NAT: F.IF.C.9 TOP: Comparing Functions

487 ANS: 3

$$j(x) = x^2 - 12x + 36 + 7 - 36$$

$$= (x - 6)^2 - 29$$

PTS: 2 REF: 061616ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

488 ANS:

$y = 0.96x + 23.95$ , 0.92, high, positive correlation between scores 85 or better on the math and English exams.

PTS: 4 REF: 061836ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

489 ANS: 4

$$(1) \frac{6-1}{1971-1898} = \frac{5}{73} \approx .07 \quad (2) \frac{14-6}{1985-1971} = \frac{8}{14} \approx .57 \quad (3) \frac{24-14}{2006-1985} = \frac{10}{21} \approx .48 \quad (4) \frac{35-24}{2012-2006} = \frac{11}{6} \approx 1.83$$

PTS: 2 REF: 011613ai NAT: F.IF.B.6 TOP: Rate of Change

490 ANS: 4

$$\frac{30}{30+12+8} = 0.6$$

PTS: 2 REF: 061615ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

- 491 ANS: 3 PTS: 2 REF: 061701ai NAT: F.IF.B.4  
TOP: Relating Graphs to Events
- 492 ANS: 3 PTS: 2 REF: 061721ai NAT: F.LE.A.1  
TOP: Families of Functions
- 493 ANS:  
 $p + 2s = 15.95$   $5p + 10s = 79.75$   
 $3p + 5s = 45.90$   $6p + 10s = 91.80$   
 $p = 12.05$
- PTS: 4 REF: 011734ai NAT: A.CED.A.3 TOP: Modeling Linear Systems
- 494 ANS: 4 PTS: 2 REF: 081723ai NAT: A.CED.A.1  
TOP: Modeling Quadratics
- 495 ANS: 2  
 $6\left(\frac{5}{6}\left(\frac{3}{8} - x\right) = 16\right)$   
 $8\left(5\left(\frac{3}{8} - x\right) = 96\right)$   
 $15 - 40x = 768$   
 $-40x = 753$   
 $x = -18.825$
- PTS: 2 REF: 081713ai NAT: A.REI.B.3 TOP: Solving Linear Equations  
KEY: fractional expressions
- 496 ANS:  
 $y^2 - 6y + 9 = 4y - 12$   
 $y^2 - 10y + 21 = 0$   
 $(y - 7)(y - 3) = 0$   
 $y = 7, 3$
- PTS: 2 REF: 011627ai NAT: A.REI.B.4 TOP: Solving Quadratics  
KEY: factoring
- 497 ANS: 1 PTS: 2 REF: 081710ai NAT: F.IF.A.2  
TOP: Domain and Range KEY: limited domain
- 498 ANS: 4 PTS: 2 REF: 011719ai NAT: F.IF.B.5  
TOP: Domain and Range KEY: context
- 499 ANS: 2 PTS: 2 REF: 081712ai NAT: A.SSE.A.1  
TOP: Modeling Expressions
- 500 ANS: 1 PTS: 2 REF: 061714ai NAT: S.ID.C.8  
TOP: Correlation Coefficient

501 ANS: 3  
 median = 3, IQR =  $4 - 2 = 2$ ,  $\bar{x} = 2.75$ . An outlier is outside the interval  $[Q_1 - 1.5(\text{IQR}), Q_3 + 1.5(\text{IQR})]$ .  
 $[2 - 1.5(2), 4 + 1.5(2)]$

$[-1, 7]$

PTS: 2 REF: 061620ai NAT: S.ID.A.1 TOP: Dot Plots

502 ANS: 3 PTS: 2 REF: 011606ai NAT: A.CED.A.4  
 TOP: Transforming Formulas

503 ANS: 3 PTS: 2 REF: 011702ai NAT: A.REI.B.4  
 TOP: Solving Quadratics KEY: factoring

504 ANS:

$$x^2 = x$$

$$x^2 - x = 0$$

$$x(x - 1) = 0$$

$$x = 0, 1$$

PTS: 2 REF: 061731ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

505 ANS: 4  
 1)  $b = 0$ ; 2)  $b = 4$ ; 3)  $b = -6$ ; 4)  $b = 5$

PTS: 2 REF: 081611ai NAT: F.IF.C.9 TOP: Comparing Functions

506 ANS: 2 PTS: 2 REF: 011723ai NAT: F.IF.C.9  
 TOP: Comparing Functions

507 ANS: 2  
 $|x + 2| = 3x - 2$   
 $x + 2 = 3x - 2$

$$4 = 2x$$

$$x = 2$$

PTS: 2 REF: 081702ai NAT: A.REI.D.11 TOP: Other Systems

508 ANS:  
 Two of the following: quadratic formula, complete the square, factor by grouping or graphically.

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8} \approx -0.7, -3.3$$

PTS: 4 REF: 011634ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

509 ANS: 1 PTS: 2 REF: 061605ai NAT: A.CED.A.3  
 TOP: Modeling Linear Systems



510 ANS:  
No. The sum of a rational and irrational is irrational.

PTS: 2 REF: 011728ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

511 ANS: 4 PTS: 2 REF: 061720ai NAT: N.Q.A.1  
TOP: Conversions KEY: dimensional analysis

512 ANS:  
 $4ax + 12 - 3ax = 25 + 3a$

$$ax = 13 + 3a$$

$$x = \frac{13 + 3a}{a}$$

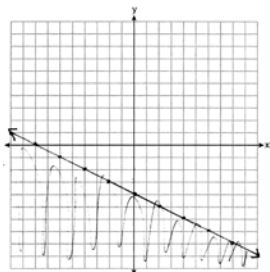
PTS: 2 REF: 081632ai NAT: A.CED.A.4 TOP: Transforming Formulas

513 ANS: 3  
 $119.67(0.61)^5 - 119.67(0.61)^3 \approx 17.06$

PTS: 2 REF: 011603ai NAT: F.IF.A.2 TOP: Evaluating Functions

514 ANS: 3 PTS: 2 REF: 081616ai NAT: A.CED.A.1  
TOP: Modeling Linear Equations

515 ANS:



PTS: 4 REF: 081634ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

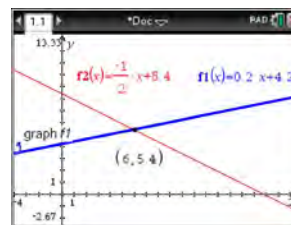
516 ANS: 1  
 $2h + 8 > 3h - 6$

$$14 > h$$

$$h < 14$$

PTS: 2 REF: 081607ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

517 ANS: 4



$$m = \frac{5 - 4.6}{4 - 2} = \frac{.4}{2} = 0.2 \quad 4(0.2x + 4.2) + 2x = 33.6 \quad y = 0.2(6) + 4.2 = 5.4$$

$$5 = 2(4) + b$$

$$0.8x + 16.8 + 2x = 33.6$$

$$4.2 = b$$

$$2.8x = 16.8$$

$$y = 0.2x + 4.2$$

$$x = 6$$

PTS: 2

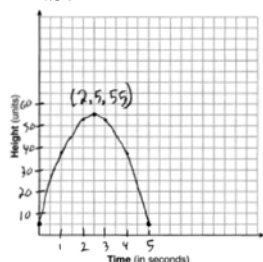
REF: 061618ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

KEY: substitution

518 ANS:



The ball reaches a maximum height of 55 units at 2.5 seconds.

PTS: 4

REF: 011736ai

NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

KEY: graph

519 ANS: 2

PTS: 2

REF: 011709ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

520 ANS:

$$H(1) - H(2) = -16(1)^2 + 144 - (-16(2)^2 + 144) = 128 - 80 = 48$$

$$-16t^2 = -144$$

$$t^2 = 9$$

$$t = 3$$

PTS: 4

REF: 061633ai

NAT: F.IF.B.4

TOP: Graphing Quadratic Functions

521 ANS:

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-6)}}{2(3)} \approx 1.79, -1.12$$

PTS: 2

REF: 012429ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: quadratic formula

522 ANS:

$7 - \sqrt{2}$  is irrational because it can not be written as the ratio of two integers.

PTS: 2

REF: 061727ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: classify

523 ANS:

$$\frac{m}{351} = \frac{70}{70+35}$$

$$105m = 24570$$

$$m = 234$$

PTS: 2

REF: 011630ai

NAT: S.ID.B.5

TOP: Frequency Tables

KEY: two-way

524 ANS:

$$12 \text{ km} \left( \frac{0.62 \text{ m}}{1 \text{ km}} \right) = 7.44 \text{ m} \quad \frac{26.2 \text{ m}}{7.44 \text{ mph}} \approx 3.5 \text{ hours}$$

PTS: 2

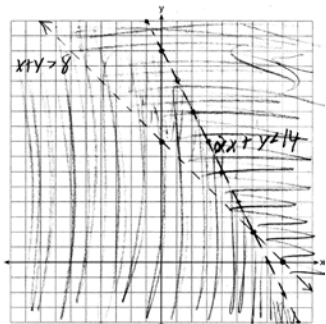
REF: 011726ai

NAT: N.Q.A.1

TOP: Conversions

KEY: dimensional analysis

525 ANS:



(6, 2) is not a solution as its falls on the edge of each inequality.

PTS: 4

REF: 061634ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

KEY: graph

526 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.

PTS: 2

REF: 081720ai

NAT: A.REI.D.10

TOP: Writing Linear Equations

KEY: other forms

527 ANS:

$$\frac{762 - 192}{92 - 32} = \frac{570}{60} = 9.5 \quad y = 9.5x \quad T = 192 + 9.5(120 - 32) = 1028$$

PTS: 4

REF: 061635ai

NAT: A.CED.A.2

TOP: Speed

528 ANS:

$f(t) = -58t + 6182$   $r = -.94$  This indicates a strong linear relationship because  $r$  is close to -1.

PTS: 4 REF: 011635ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

529 ANS:

$$\frac{238 - 112}{4 - 2} = 63 \text{ mph}$$

PTS: 2 REF: 012427ai NAT: F.IF.B.6 TOP: Rate of Change

530 ANS: 4 PTS: 2 REF: 011706ai NAT: A.REI.B.4

TOP: Solving Quadratics KEY: graph

531 ANS:

$$b(x - 3) \geq ax + 7b$$

$$bx - 3b \geq ax + 7b$$

$$bx - ax \geq 10b$$

$$x(b - a) \geq 10b$$

$$x \leq \frac{10b}{b - a}$$

PTS: 2 REF: 011631ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

532 ANS:

No. There are infinite solutions.

PTS: 2 REF: 011725ai NAT: A.REI.C.6 TOP: Solving Linear Systems

KEY: substitution

533 ANS:

$0 = (B + 3)(B - 1)$  Janice substituted  $B$  for  $8x$ , resulting in a simpler quadratic. Once factored, Janice substituted

$$0 = (8x + 3)(8x - 1)$$

$$x = -\frac{3}{8}, \frac{1}{8}$$

$8x$  for  $B$ .

PTS: 4 REF: 081636ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

534 ANS: 2

$$\frac{14}{16 + 20 + 14} = 28\%$$

PTS: 2 REF: 011705ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

535 ANS: 1 PTS: 2 REF: 061606ai NAT: F.LE.A.1

TOP: Families of Functions

536 ANS: 4

Vertex (4,1)

PTS: 2

REF: 012424ai

NAT: F.IF.A.2

TOP: Domain and Range

537 ANS: 2

$$f(-2) = (-2 - 1)^2 + 3(-2) = 9 - 6 = 3$$

PTS: 2

REF: 081605ai

NAT: F.IF.A.2

TOP: Functional Notation

538 ANS: 2

PTS: 2

REF: 011601ai

NAT: F.IF.C.8

TOP: Vertex Form of a Quadratic

539 ANS:

$$\frac{2}{40} = \frac{5.75}{x} \quad \frac{5280}{115} \approx 46$$

$$x = 115$$

PTS: 2

REF: 081730ai

NAT: N.Q.A.1

TOP: Conversions

540 ANS: 4

PTS: 2

REF: 081709ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

541 ANS: 4

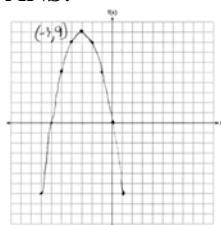
PTS: 2

REF: 061602ia

NAT: A.SSE.A.1

TOP: Modeling Expressions

542 ANS:



PTS: 2

REF: 061726ai

NAT: F.IF.C.7

TOP: Graphing Quadratic Functions

KEY: graph

543 ANS: 4

PTS: 2

REF: 011703ai

NAT: S.ID.C.8

TOP: Correlation Coefficient

544 ANS: 4

PTS: 2

REF: 081604ai

NAT: F.LE.A.2

TOP: Modeling Linear Functions

545 ANS:

$$\frac{480 - 140}{7 - 2} = 68 \text{ mph}$$

PTS: 2

REF: 011731ai

NAT: F.IF.B.6

TOP: Rate of Change

546 ANS:

$$5x + 4x^2(2x + 7) - 6x^2 - 9x = -4x + 8x^3 + 28x^2 - 6x^2 = 8x^3 + 22x^2 - 4x$$

PTS: 2

REF: 081731ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: multiplication

547 ANS:

$$108 = x(24 - x) \quad 18 \times 6$$

$$108 = 24x - x^2$$

$$x^2 - 24x + 108 = 0$$

$$(x - 18)(x - 6) = 0$$

$$x = 18, 6$$

PTS: 4

REF: 011636ai

NAT: A.CED.A.1

TOP: Geometric Applications of Quadratics

548 ANS: 2

$$16x^2 - 36 = 4(2x + 3)(2x - 3)$$

PTS: 2

REF: 011701ai

NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

549 ANS: 3

PTS: 2

REF: 011711ai

NAT: F.LE.A.1

TOP: Families of Functions

550 ANS:

$$x^2 - 6x + 9 = 15 + 9$$

$$(x - 3)^2 = 24$$

$$x - 3 = \pm\sqrt{24}$$

$$x = 3 \pm 2\sqrt{6}$$

PTS: 2

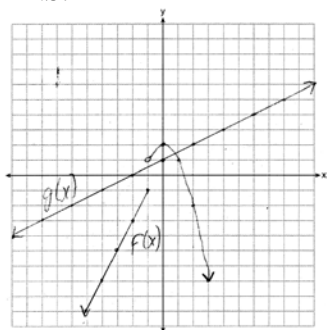
REF: 081732ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

551 ANS:



1, because the graphs only intersect once.

PTS: 4

REF: 061636ai

NAT: A.REI.D.11

TOP: Other Systems

552 ANS:

$$g(x) = 2(2x + 1)^2 - 1 = 2(4x^2 + 4x + 1) - 1 = 8x^2 + 8x + 2 - 1 = 8x^2 + 8x + 1$$

PTS: 2

REF: 061625ai

NAT: F.BF.A.1

TOP: Operations with Functions

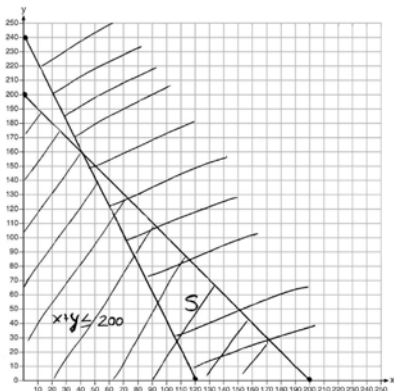
553 ANS:

$$x + y \leq 200 \quad \text{Marta is incorrect because } 12.5(30) + 6.25(80) < 1500$$

$$12.5x + 6.25y \geq 1500$$

$$375 + 500 < 1500$$

$$875 < 1500$$



PTS: 6

REF: 011637ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

KEY: graph

554 ANS: 2

$$f(x) = x^2 + 2x - 8 = x^2 + 2x + 1 - 9 = (x + 1)^2 - 9$$

PTS: 2

REF: 061611ai

NAT: F.IF.A.2

TOP: Domain and Range

KEY: real domain, quadratic

555 ANS:

$$(x - 3)^2 - 49 = 0$$

$$(x - 3)^2 = 49$$

$$x - 3 = \pm 7$$

$$x = -4, 10$$

PTS: 2

REF: 081631ai

NAT: A.APR.B.3

TOP: Zeros of Polynomials

556 ANS:

$2\sqrt{3} + 6$  is irrational because it can not be written as the ratio of two integers.

PTS: 2

REF: 012426ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: classify

557 ANS:

$f(x) = 0.75x + 4.50$ . Each card costs 75¢ and start-up costs were \$4.50.

PTS: 4

REF: 011735ai

NAT: F.LE.A.2

TOP: Modeling Linear Functions

558 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

$$35 = 2.5G \quad 25 = 2G$$

$$G = 14 \quad G = 12.5$$

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.

PTS: 2 REF: 081728ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

559 ANS: 2 PTS: 2 REF: 012422ai NAT: N.Q.A.1

TOP: Conversions

560 ANS: 1

$$3x^2 + 10x - 8 = 0$$

$$(3x - 2)(x + 4) = 0$$

$$x = \frac{2}{3}, -4$$

PTS: 2 REF: 081619ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

561 ANS:

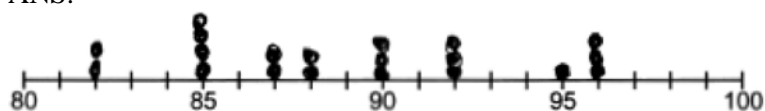
 $x^2 + 3x - 18 = 0$  The zeros are the  $x$ -intercepts of  $r(x)$ .

$$(x + 6)(x - 3) = 0$$

$$x = -6, 3$$

PTS: 4 REF: 061733ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

562 ANS:



89

PTS: 2 REF: 012425ai NAT: S.ID.A.1 TOP: Dot Plots

563 ANS: 1 PTS: 2 REF: 081617ai NAT: F.LE.A.2

TOP: Modeling Exponential Functions

564 ANS: 4 PTS: 2 REF: 011608ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

565 ANS: 1

$$f(x) = x^2 - 5x - 6 = (x + 1)(x - 6) = 0$$

$$x = -1, 6$$

PTS: 2 REF: 061612ai NAT: A.APR.B.3 TOP: Zeros of Polynomials



566 ANS: 2

$$x^2 - 8x + 16 = 10 + 16$$

$$(x - 4)^2 = 26$$

$$x - 4 = \pm\sqrt{26}$$

$$x = 4 \pm \sqrt{26}$$

PTS: 2 REF: 061722ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

567 ANS:

No,  $-2$  is the coefficient of the term with the highest power.

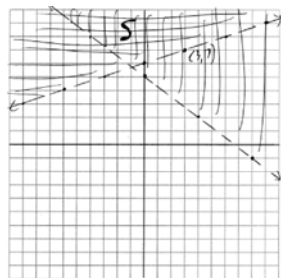
PTS: 2 REF: 081628ai NAT: A.SSE.A.1 TOP: Modeling Expressions

568 ANS:

Linear, because the function has a constant rate of change.

PTS: 2 REF: 011625ai NAT: F.LE.A.1 TOP: Families of Functions

569 ANS:

No,  $(3, 7)$  is on the boundary line, and not included in the solution set, because this is a strict inequality.

PTS: 4 REF: 081735ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: graph

570 ANS:

 $g(x)$  is  $f(x)$  shifted right by  $a$ ,  $h(x)$  is  $f(x)$  shifted down by  $a$ .

PTS: 2 REF: 061732ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

571 ANS:

 $7\sqrt{2}$  is irrational because it can not be written as the ratio of two integers.

PTS: 2 REF: 081629ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

572 ANS: 3

PTS: 2

REF: 011724ai

NAT: F.LE.B.5

TOP: Modeling Exponential Functions

573 ANS: 1

$$3(-2x + 2x + 8) = 12$$

$$24 \neq 12$$

PTS: 2 REF: 061708ai NAT: A.REI.C.6 TOP: Solving Linear Systems

KEY: substitution

574 ANS: 3

$$E(10) = 1(1.11)^{10} \approx 3 \quad S(10) = 30(1.04)^{10} \approx 44$$

$$E(53) = 1(1.11)^{53} \approx 252 \quad S(53) = 30(1.04)^{53} \approx 239$$

PTS: 2 REF: 081721ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

575 ANS: 2

The slope of a line connecting (5, 19) and (10, 20) is lowest.

PTS: 2 REF: 081705ai NAT: F.IF.B.6 TOP: Rate of Change

576 ANS: 4

$$3x + 2 \leq 5x - 20$$

$$22 \leq 2x$$

$$11 \leq x$$

PTS: 2 REF: 061609ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

577 ANS:

$$2x^2 + 5x - 42 = 0 \quad \text{Agree, as shown by solving the equation by factoring.}$$

$$(x + 6)(2x - 7) = 0$$

$$x = -6, \frac{7}{2}$$

PTS: 2 REF: 061628ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

578 ANS: 4

$$y - 34 = x^2 - 12x$$

$$y = x^2 - 12x + 34$$

$$y = x^2 - 12x + 36 - 2$$

$$y = (x - 6)^2 - 2$$

PTS: 2 REF: 011607ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

579 ANS:

$$f(x) = 10 + 100x, g(x) = 10(2)^x; \text{ both, since } f(7) = 10 + 100(7) = 710 \text{ and } g(7) = 10(2)^7 = 1280$$

PTS: 4 REF: 061736ai NAT: F.LE.A.3 TOP: Families of Functions

580 ANS:

There is 2 inches of snow every 4 hours.

PTS: 2 REF: 061630ai NAT: F.LE.B.5 TOP: Modeling Linear Functions

581 ANS: 1 PTS: 2 REF: 081618ai NAT: F.LE.A.3

TOP: Families of Functions

582 ANS: 1 PTS: 2 REF: 061603ai NAT: F.IF.B.6

TOP: Rate of Change

583 ANS: 2

$$x^2 - 8x = 7$$

$$x^2 - 8x + 16 = 7 + 16$$

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

PTS: 2 REF: 011614ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

584 ANS: 3

$$C(t) = 10(1.029)^{24t} = 10(1.029^{24})^t \approx 10(1.986)^t$$

PTS: 2 REF: 061614ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

585 ANS: 3 PTS: 2 REF: 061706ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: higher power

586 ANS: 2 PTS: 2 REF: 061712ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

587 ANS: 1 PTS: 2 REF: 011623ai NAT: F.LE.A.1

TOP: Families of Functions

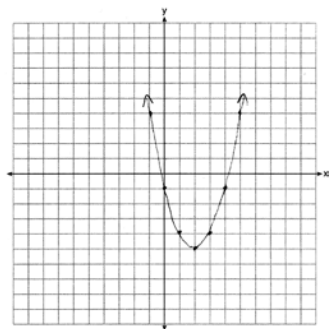
588 ANS:

$$\frac{S}{180} = n - 2$$

$$\frac{S}{180} + 2 = n$$

PTS: 2 REF: 061631ai NAT: A.CED.A.4 TOP: Transforming Formulas

589 ANS:



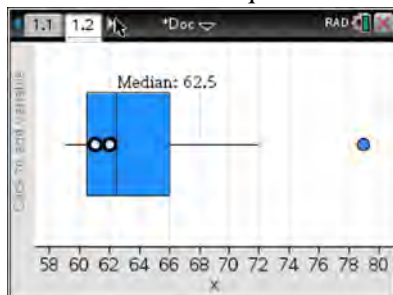
$$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$$

PTS: 2 REF: 061627ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions

KEY: graph

590 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  $Q3 + 1.5 \cdot IRQ = 66 + 1.5(66 - 60.5) = 74.25$ .



PTS: 2 REF: 061715ai NAT: S.ID.A.3 TOP: Central Tendency and Dispersion

591 ANS: 3

$$(2x + 3)(4x^2 - 5x + 6) = 8x^3 - 10x^2 + 12x + 12x^2 - 15x + 18 = 8x^3 + 2x^2 - 3x + 18$$

PTS: 2 REF: 081612ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

592 ANS: 2 PTS: 2 REF: 081708ai NAT: S.ID.C.9

TOP: Analysis of Data

593 ANS:

D-E, because his speed was slower. Craig may have stayed at a rest stop during B-C.  $\frac{230-0}{7-0} \approx 32.9$

PTS: 4 REF: 061734ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

594 ANS:

No, because the relation does not pass the vertical line test.

PTS: 2 REF: 011626ai NAT: F.IF.A.1 TOP: Defining Functions

KEY: graphs

595 ANS: 2 PTS: 2 REF: 011714ai NAT: A.SSE.B.3

TOP: Modeling Exponential Functions

596 ANS: 1

$$2 + \frac{4}{9}x \geq 4 + x$$

$$-2 \geq \frac{5}{9}x$$

$$x \leq -\frac{18}{5}$$

PTS: 2 REF: 081711ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

597 ANS:

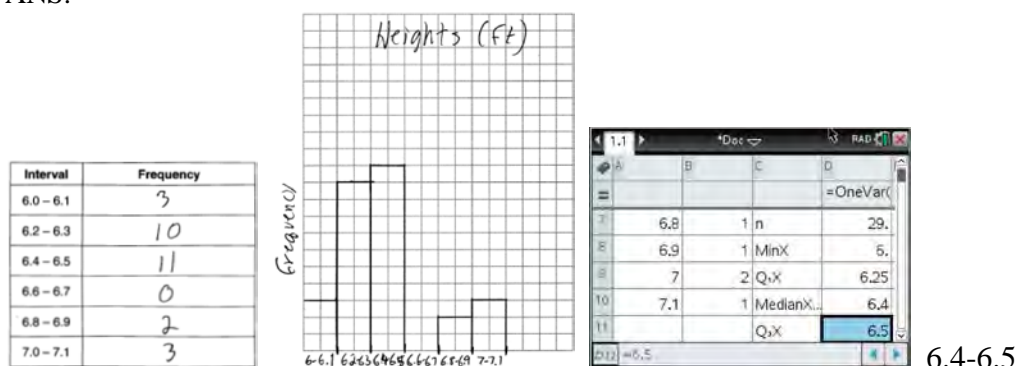
The slope represents the amount paid each month and the y-intercept represents the initial cost of membership.

PTS: 2 REF: 011629ai NAT: F.LE.B.5 TOP: Modeling Linear Functions

598 ANS: 1 PTS: 2 REF: 011721ai NAT: F.IF.B.6

TOP: Rate of Change

599 ANS:



PTS: 4 REF: 081734ai NAT: S.ID.A.1 TOP: Frequency Histograms  
 KEY: frequency histograms

600 ANS: 3

$$5x^2 - (4x^2 - 12x + 9) = x^2 + 12x - 9$$

PTS: 2 REF: 011610ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
 KEY: multiplication

601 ANS: 2 PTS: 2 REF: 061624ai NAT: F.LE.A.1  
 TOP: Families of Functions

602 ANS: 4 PTS: 2 REF: 011720ai NAT: S.ID.A.2  
 TOP: Central Tendency and Dispersion

603 ANS:

$$x + y \leq 200 \quad 12x + 8.50(50) \geq 1000$$

$$12x + 8.50y \geq 1000 \quad 12x + 425 \geq 1000$$

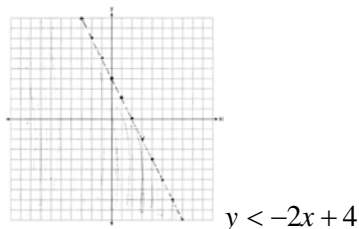
$$12x \geq 575$$

$$x \geq \frac{575}{12}$$

$$48$$

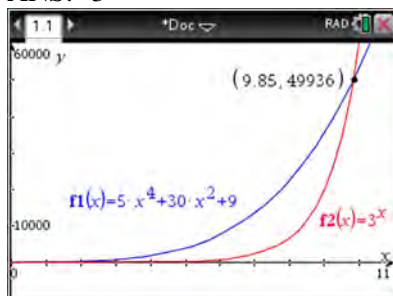
PTS: 4 REF: 081635ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

604 ANS:



PTS: 2 REF: 061730ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

605 ANS: 3



PTS: 2 REF: 061621ai NAT: F.LE.A.3 TOP: Families of Functions

606 ANS: 2

$$36x^2 - 100 = 4(9x^2 - 25) = 4(3x + 5)(3x - 5)$$

PTS: 2 REF: 081608ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares KEY: quadratic

607 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,  $\frac{35}{2}$ .

PTS: 2 REF: 081725ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

608 ANS:

$x = \frac{-128}{2(-16)} = 4$   $h(4) = -16(4)^2 + 128(4) + 9000 = -256 + 512 + 9000 = 9256$  (4, 9256). The y coordinate represents the pilot's height above the ground after ejection.  $9256 - 9000 = 256$

PTS: 4 REF: 081736ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: key features

609 ANS: 2 PTS: 2 REF: 011717ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

610 ANS:

$$f(5) = (8) \cdot 2^5 = 256 \quad f(t) = g(t)$$

$$g(5) = 2^{5+3} = 256 \quad (8) \cdot 2^t = 2^{t+3}$$

$$2^3 \cdot 2^t = 2^{t+3}$$

$$2^{t+3} = 2^{t+3}$$

PTS: 2 REF: 011632ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

611 ANS: 4 PTS: 2 REF: 061623ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

612 ANS:

$$18j + 32w = 19.92 \quad 14(.52) + 26(.33) = 15.86 \neq 15.76 \quad 7(18j + 32w = 19.92) \quad 18j + 32(.24) = 19.92$$

$$14j + 26w = 15.76$$

$$9(14j + 26w = 15.76) \quad 18j + 7.68 = 19.92$$

$$126j + 224w = 139.44 \quad 18j = 12.24$$

$$126j + 234w = 141.84 \quad j = .68$$

$$10w = 2.4$$

$$w = .24$$

PTS: 6 REF: 081637ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

613 ANS: 3

PTS: 2

REF: 011622ai

NAT: F.IF.C.9

TOP: Comparing Functions

614 ANS:

	Watch Sports	Don't Watch Sports	Total
Like Pop	26	28	54
Don't Like Pop	34	12	46
Total	60	40	100

PTS: 2

REF: 061729ai

NAT: S.ID.B.5

TOP: Frequency Tables

KEY: two-way

615 ANS: 2

PTS: 2

REF: 061604ai

NAT: S.ID.C.8

TOP: Correlation Coefficient

616 ANS: 2

PTS: 2

REF: 011605ai

NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

617 ANS: 1

$$C(68) = \frac{5}{9}(68 - 32) = 20$$

PTS: 2

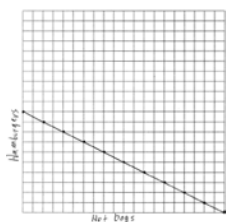
REF: 011710ai

NAT: N.Q.A.1

TOP: Conversions

KEY: formula

618 ANS:



$$1.25x + 2.5y = 25$$

$$x + 2y = 20$$

There are 11 combinations, as each dot represents a possible combination.

PTS: 6

REF: 081737ai

NAT: A.CED.A.2

TOP: Graphing Linear Functions

619 ANS: 1

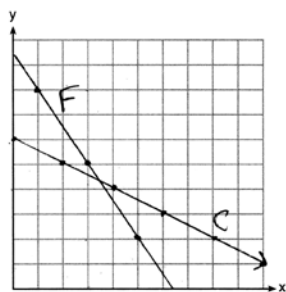
PTS: 2

REF: 081717ai

NAT: F.LE.A.1

TOP: Families of Functions

620 ANS:



$$3x + 2y = 19 \quad 6x + 4y = 38 \quad 2(3.50) + 4y = 24$$

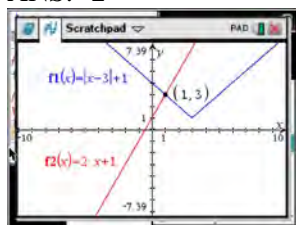
$$2x + 4y = 24 \quad 2x + 4y = 24 \quad 7 + 4y = 24$$

$$4x = 14 \quad 4y = 17$$

$$x = 3.50 \quad y = 4.25$$

PTS: 6 REF: 061637ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

621 ANS: 2



$$|x - 3| + 1 = 2x + 1 \quad x - 3 = 2x \quad x - 3 = -2x$$

$$|x - 3| = 2x \quad -3 = x \quad 3x = 3$$

$$\text{extraneous} \quad x = 1$$

PTS: 2 REF: 061622ai NAT: A.REI.D.11 TOP: Other Systems

622 ANS: 3 PTS: 2 REF: 081602ai NAT: A.REI.D.10

TOP: Identifying Solutions

623 ANS: 3

$$a_n = 3n + 1$$

$$a_5 = 3(5) + 1 = 16$$

PTS: 2 REF: 061613ai NAT: F.BF.A.1 TOP: Sequences

KEY: explicit

624 ANS: 4

$$\text{Vertex } (15, 25), \text{ point } (10, 12.5) \quad 12.5 = a(10 - 15)^2 + 25$$

$$-12.5 = 25a$$

$$-\frac{1}{2} = a$$

PTS: 2 REF: 061716ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

625 ANS: 2 PTS: 2 REF: 011602ai NAT: A.CED.A.2

TOP: Graphing Linear Functions



626 ANS: 1

$$12.5 \text{ sec} \times \frac{1 \text{ min}}{60 \text{ sec}} = 0.208\bar{3} \text{ min}$$

PTS: 2 REF: 061608ai NAT: N.Q.A.1 TOP: Conversions

KEY: dimensional analysis

627 ANS: 2

$$3(x^2 - 1) - (x^2 - 7x + 10)$$

$$3x^2 - 3 - x^2 + 7x - 10$$

$$2x^2 + 7x - 13$$

PTS: 2 REF: 061610ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

628 ANS: 3

$$2(x + 2)^2 = 32$$

$$(x + 2)^2 = 16$$

$$x + 2 = \pm 4$$

$$x = -6, 2$$

PTS: 2 REF: 061619ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

629 ANS: 1

$$2(x^2 - 6x + 3) = 0$$

$$x^2 - 6x = -3$$

$$x^2 - 6x + 9 = -3 + 9$$

$$(x - 3)^2 = 6$$

PTS: 2 REF: 011722ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

630 ANS: 3 PTS: 2 REF: 011612ai NAT: A.SSE.A.2

TOP: Factoring Polynomials KEY: higher power

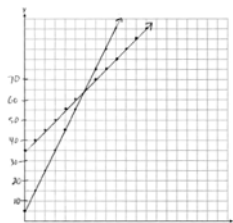
631 ANS: 2 PTS: 2 REF: 011713ai NAT: S.ID.C.9

TOP: Analysis of Data

632 ANS: 3 PTS: 2 REF: 061601ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares KEY: higher power

633 ANS:



$y = 10x + 5$  In 2016, the swim team and chorus will each have 65 members.

$$y = 5x + 35$$

PTS: 6 REF: 061737ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

634 ANS: 3 PTS: 2 REF: 012423ai NAT: A.APR.B.3

TOP: Zeros of Polynomials

635 ANS: 2 PTS: 2 REF: 061617ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

636 ANS:

$$1000 - 60x = 600 - 20x. \quad 1000 - 60(10) = 400. \quad \text{Ian is incorrect because } I = 1000 - 6(16) = 40 \neq 0$$

$$40x = 400$$

$$x = 10$$

PTS: 6 REF: 011737ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

637 ANS:

Exponential, because the function does not have a constant rate of change.

PTS: 2 REF: 081627ai NAT: F.LE.A.1 TOP: Families of Functions

638 ANS: 2 PTS: 2 REF: 011619ai NAT: F.IF.A.2

TOP: Domain and Range KEY: real domain, exponential

639 ANS: 3

$$3(x^2 + 4x + 4) - 12 + 11$$

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

PTS: 2 REF: 081621ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

640 ANS: 2 PTS: 2 REF: 061702ai NAT: A.SSE.A.1

TOP: Dependent and Independent Variables

641 ANS: 4 PTS: 2 REF: 011718ai NAT: A.SSE.A.1

TOP: Modeling Expressions

642 ANS: 2 PTS: 2 REF: 081624ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

643 ANS:

$$y = 17.159x - 2.476. \quad y = 17.159(.65) - 2.476 \approx 8.7$$

PTS: 4 REF: 081633ai NAT: S.ID.B.6 TOP: Regression

KEY: linear

644 ANS: 2  
 $r = 0.92$

PTS: 2 REF: 081606ai NAT: S.ID.C.8 TOP: Correlation Coefficient

645 ANS: 1 PTS: 2 REF: 061711ai NAT: A.CED.A.3  
 TOP: Modeling Systems of Linear Inequalities

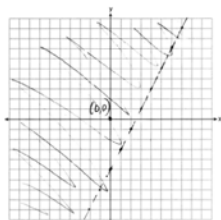
646 ANS: 4  
 $36x + 30y = 96$

PTS: 2 REF: 081724ai NAT: A.REI.C.6 TOP: Solving Linear Systems

647 ANS:  
 The data is continuous, i.e. a fraction of a cookie may be eaten.

PTS: 2 REF: 081729ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

648 ANS:



PTS: 2 REF: 011729ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

649 ANS: 1  
 $0 = -16t^2 + 24t$   
 $0 = -8t(2t - 3)$   
 $t = 0, \frac{3}{2}$

PTS: 2 REF: 061724ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
 KEY: key features

650 ANS:  
 During 1960-1965 the graph has the steepest slope.

PTS: 2 REF: 011628ai NAT: F.IF.B.6 TOP: Rate of Change

651 ANS:  
 $1.8 - 0.4y \geq 2.2 - 2y$   
 $1.6y \geq 0.4$   
 $y \geq 0.25$

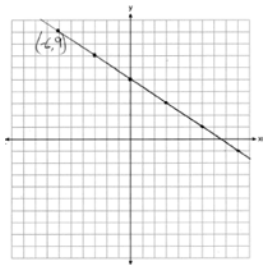
PTS: 2 REF: 011727ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

652 ANS: 3  
 The rocket was in the air more than 7 seconds before hitting the ground.

PTS: 2 REF: 081613ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
 KEY: key features

653 ANS: 3                      PTS: 2                      REF: 081609ai                      NAT: N.Q.A.1  
TOP: Using Rate

654 ANS:



$(-6, 9)$  is a solution to the equation because it falls on the line.

PTS: 2                      REF: 012428ai                      NAT: F.IF.B.4                      TOP: Graphing Linear Functions  
655 ANS: 3                      PTS: 2                      REF: 081703ai                      NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares                      KEY: quadratic

656 ANS: 1

$$4(x - 7) = 0.3(x + 2) + 2.11$$

$$4x - 28 = 0.3x + 0.6 + 2.11$$

$$3.7x - 28 = 2.71$$

$$3.7x = 30.71$$

$$x = 8.3$$

PTS: 2                      REF: 061719ai                      NAT: A.REI.B.3                      TOP: Solving Linear Equations  
KEY: decimals

657 ANS: 1                      PTS: 2                      REF: 011712ai                      NAT: F.IF.C.7  
TOP: Graphing Absolute Value Functions

658 ANS: 1

$$\frac{1}{2}x + 3 = |x| \quad -\frac{1}{2}x - 3 = x$$

$$\frac{1}{2}x + 3 = x \quad -x - 6 = 2x$$

$$-6 = 3x$$

$$x + 6 = 2x$$

$$-2 = x$$

$$6 = x$$

PTS: 2                      REF: 011617ai                      NAT: A.REI.D.11                      TOP: Other Systems  
659 ANS: 1                      PTS: 2                      REF: 011615ai                      NAT: F.IF.B.5  
TOP: Domain and Range                      KEY: context

660 ANS: 1                      PTS: 2                      REF: 081706ai                      NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions

661 ANS: 4                      PTS: 2                      REF: 081622ai                      NAT: A.REI.C.6  
TOP: Solving Linear Systems

662 ANS: 4

$$1) y = 3x + 2; 2) \frac{-5-2}{3-2} = -7; 3) y = -2x + 3; 4) y = -3x + 5$$

PTS: 2 REF: 081615ai NAT: F.IF.B.6 TOP: Rate of Change

663 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.

PTS: 2 REF: 011732ai NAT: F.IF.A.1 TOP: Defining Functions

KEY: graphs

664 ANS:

$$C = 1.29 + .99(s - 1) \text{ No, because } C = 1.29 + .99(52 - 1) = 51.78$$

PTS: 2 REF: 011730ai NAT: A.CED.A.2 TOP: Modeling Linear Equations

665 ANS:

$$3\sqrt{2} \cdot 8\sqrt{18} = 24\sqrt{36} = 144 \text{ is rational, as it can be written as the ratio of two integers.}$$

PTS: 2 REF: 061626ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

666 ANS: 4

$$2(2) < -12(-3) + 4 \quad 4 < -6(-3) + 4$$

$$4 < 40 \quad 4 < 22$$

PTS: 2 REF: 011716ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: solution set

667 ANS: 4

PTS: 2

REF: 081603ai

NAT: S.ID.A.1

TOP: Box Plots KEY: interpret

668 ANS: 1

The graph is steepest between hour 0 and hour 1.

PTS: 2 REF: 081601ai NAT: F.IF.B.6 TOP: Rate of Change

669 ANS: 3

PTS: 2

REF: 011704ai

NAT: A.CED.A.4

TOP: Transforming Formulas

670 ANS: 3

PTS: 2

REF: 061709ai

NAT: F.IF.A.1

TOP: Defining Functions

KEY: ordered pairs

671 ANS:

$$1 - 0.85 = 0.15 = 15\% \text{ To find the rate of change of an equation in the form } y = ab^x, \text{ subtract } b \text{ from 1.}$$

PTS: 2 REF: 061728ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions

672 ANS: 3

$$x = 3$$

PTS: 2 REF: 061717ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

673 ANS: 3

PTS: 2

REF: 081614ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

674 ANS: 4

$$36x^2 = 25$$

$$x^2 = \frac{25}{36}$$

$$x = \pm \frac{5}{6}$$

PTS: 2 REF: 011715ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

675 ANS:

$$5x^2 - 10$$

PTS: 2 REF: 061725ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

676 ANS:

-3, 1

PTS: 2 REF: 081630ai NAT: A.REI.D.11 TOP: Other Systems

677 ANS: 1

$$f(3) = -2(3)^2 + 32 = -18 + 32 = 14$$

PTS: 2 REF: 061705ai NAT: F.IF.A.2 TOP: Functional Notation

678 ANS:

$$2x^2 + 3x + 10 = 4x + 32 \quad x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)} \approx -3.1, 3.6. \text{ Quadratic formula, because the answer must be}$$

$$2x^2 - x - 22 = 0$$

to the nearest tenth.

PTS: 4 REF: 061735ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

679 ANS: 2 PTS: 2 REF: 081620ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

680 ANS: 2 PTS: 2 REF: 081714ai NAT: F.LE.A.2

TOP: Families of Functions

681 ANS: 4

$$2(3g - 4) - (8g + 3) = 6g - 8 - 8g - 3 = -2g - 11$$

PTS: 2 REF: 011707ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: subtraction

682 ANS: 3

$$f(8) = \frac{1}{2}(8)^2 - \left( \frac{1}{4}(8) + 3 \right) = 32 - 5 = 27$$

PTS: 2 REF: 081704ai NAT: F.IF.A.2 TOP: Functional Notation

683 ANS: 1 PTS: 2 REF: 081722ai NAT: S.ID.C.8

TOP: Correlation Coefficient

684 ANS:

$$610 - 55(4) = 390 \quad \frac{390}{65} = 6 \quad 4 + 6 = 10 \quad 610 - 55(2) = 500 \quad \frac{500}{65} \approx 7.7 \quad 10 - (2 + 7.7) \approx 0.3$$

PTS: 4 REF: 081733ai NAT: A.CED.A.2 TOP: Speed

685 ANS: 3 PTS: 2 REF: 061723ai NAT: A.CED.A.4  
TOP: Transforming Formulas686 ANS: 2 PTS: 2 REF: 061704ai NAT: F.LE.B.5  
TOP: Modeling Linear Functions

687 ANS: 4

$$47 - 4x < 7$$

$$-4x < -40$$

$$x > 10$$

PTS: 2 REF: 061713ai NAT: A.REI.B.3 TOP: Interpreting Solutions

688 ANS:

$$m = \frac{4-1}{-3-6} = \frac{3}{-9} = -\frac{1}{3} \quad y - y_1 = m(x - x_1)$$

$$4 = -\frac{1}{3}(-3) + b \quad y - 4 = -\frac{1}{3}(x + 3)$$

$$4 = 1 + b$$

$$3 = b$$

$$y = -\frac{1}{3}x + 3$$

PTS: 2 REF: 061629ai NAT: A.REI.D.10 TOP: Writing Linear Equations  
KEY: other forms689 ANS: 3 PTS: 2 REF: 061710ai NAT: A.APR.B.3  
TOP: Zeros of Polynomials690 ANS: 2 PTS: 2 REF: 061424ai NAT: F.BF.A.1  
TOP: Sequences KEY: explicit

## Algebra I Regents at Random Worksheets

## Answer Section

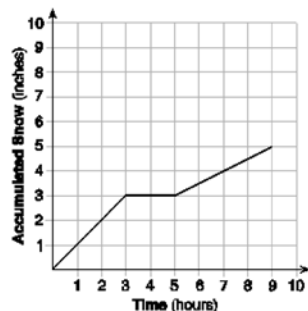
691 ANS: 2 PTS: 2 REF: 061404ai NAT: A.REI.D.12  
TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph

692 ANS: 2  
$$\frac{1}{\sqrt{4}} + \frac{1}{\sqrt{9}} = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

PTS: 2 REF: 081522ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

693 ANS: 1 PTS: 2 REF: 061401ai NAT: A.REI.A.1  
TOP: Identifying Properties

694 ANS:



At 6 hours,  $3\frac{1}{2}$  inches of snow have fallen.

PTS: 4 REF: spr1307ai NAT: F.IF.B.4 TOP: Relating Graphs to Events  
695 ANS: 1 PTS: 2 REF: 081515ai NAT: F.IF.B.6  
TOP: Rate of Change

696 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  $x$ .

PTS: 4 REF: 061534ai NAT: F.IF.A.2 TOP: Functional Notation

697 ANS:  
 $(2w)(w) = 34$   
 $w^2 = 17$   
 $w \approx 4.1$

PTS: 2 REF: 061532ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics



698 ANS: 1

$$\frac{0.8(10^2) - 0.8(5^2)}{10 - 5} = \frac{80 - 20}{5} = 12$$

PTS: 2

REF: 011521ai

NAT: F.IF.B.6

TOP: Rate of Change

699 ANS: 2

$$x^2 + 4x = 16$$

$$x^2 + 4x + 4 = 16 + 4$$

$$(x + 2)^2 = 20$$

$$x + 2 = \pm\sqrt{4 \cdot 5}$$

$$= -2 \pm 2\sqrt{5}$$

PTS: 2

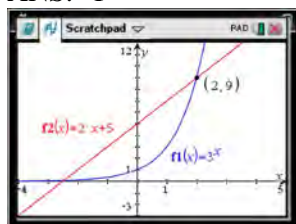
REF: 061410ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

700 ANS: 1



$$f(-1) < g(-1)$$

$$3^{-1} < 2(-1) + 5$$

$$\frac{1}{3} < 3$$

PTS: 2

REF: 061515ai

NAT: F.LE.A.3

TOP: Families of Functions

701 ANS: 2

PTS: 2

REF: 081416ai

NAT: F.BF.A.1

TOP: Sequences

KEY: explicit

702 ANS: 3

PTS: 2

REF: 081410ai

NAT: F.LE.A.1

TOP: Families of Functions

KEY: bimodalgraph

703 ANS:

$$T(d) = 2d + 28 \quad T(6) = 2(6) + 28 = 40$$

PTS: 2

REF: 081532ai

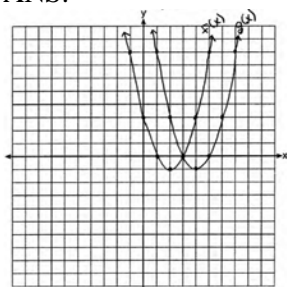
NAT: F.BF.A.1

TOP: Modeling Linear Functions

704 ANS: 2  
 $0 = -16t^2 + 144$   
 $16t^2 = 144$   
 $t^2 = 9$   
 $t = 3$

PTS: 2 REF: 081423ai NAT: F.IF.B.5 TOP: Domain and Range  
 KEY: context

705 ANS:



(4, -1).  $f(x - 2)$  is a horizontal shift two units to the right.

PTS: 2 REF: 061428ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions

706 ANS: 2  
 $L + S = 20$        $27.98L + 10.98(20 - L) = 355.60$   
 $27.98L + 10.98S = 355.60$      $27.98L + 219.60 - 10.98L = 355.60$   
 $17L = 136$   
 $L = 8$

PTS: 2 REF: 081510ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

707 ANS: 4 PTS: 2 REF: spr1304ai NAT: A.CED.A.1  
 TOP: Geometric Applications of Quadratics

708 ANS:  
 $(2x + 16)(2x + 12) = 396$ . The length,  $2x + 16$ , and the width,  $2x + 12$ , are multiplied and set equal to the area.  
 $(2x + 16)(2x + 12) = 396$   
 $4x^2 + 24x + 32x + 192 = 396$   
 $4x^2 + 56x - 204 = 0$   
 $x^2 + 14x - 51 = 0$   
 $(x + 17)(x - 3) = 0$   
 $x = 3 = \text{width}$

PTS: 4 REF: 061434ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

709 ANS:  
0.5 represents the rate of decay and 300 represents the initial amount of the compound.

PTS: 2 REF: 061426ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions

710 ANS: 4  
 $y + 3 = 6(0)$   
 $y = -3$

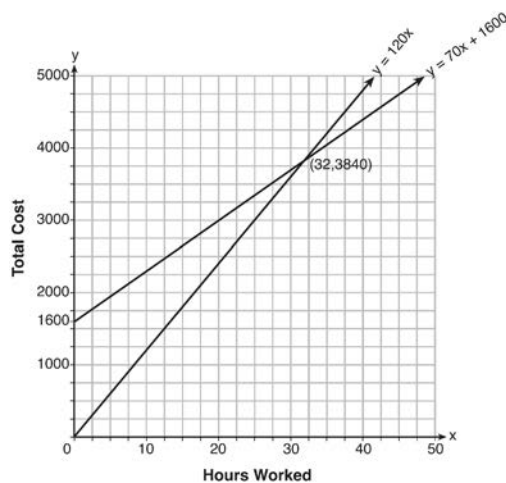
PTS: 2 REF: 011509ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

711 ANS: 2 PTS: 2 REF: 081402ai NAT: F.LE.B.5  
TOP: Modeling Linear Functions

712 ANS:  
Correct. The sum of a rational and irrational is irrational.

PTS: 2 REF: 011525ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify

713 ANS:



$$y = 120x \text{ and } y = 70x + 1600$$

$$120x = 70x + 1600$$

$$50x = 1600$$

$$x = 32$$

$$y = 120(35) = 4200 \quad \text{Green Thumb is less expensive.}$$

$$y = 70(35) + 1600 = 4050$$

PTS: 6 REF: fall1315ai NAT: A.REI.C.6 TOP: Graphing Linear Systems  
714 ANS: 3 PTS: 2 REF: 011518ai NAT: A.REI.D.11  
TOP: Other Systems

715 ANS: 3

$$h(x) = -x^2 + x + 6 \quad \text{Maximum of } f(x) = 9 \quad k(x) = -5x^2 - 12x + 4 \quad \text{Maximum of } g(x) < 5$$

$$x = \frac{-1}{2(-1)} = \frac{1}{2}$$

$$x = \frac{12}{2(-5)} = -\frac{6}{5}$$

$$y = -\left(\frac{1}{2}\right)^2 + \frac{1}{2} + 6$$

$$y = -5\left(-\frac{6}{5}\right)^2 - 12\left(-\frac{6}{5}\right) + 4$$

$$= -\frac{1}{4} + \frac{2}{4} + 6$$

$$= -\frac{36}{5} + \frac{72}{5} + \frac{20}{5}$$

$$= 6\frac{1}{4}$$

$$= \frac{56}{5}$$

$$= 11\frac{1}{5}$$

PTS: 2

REF: 061514ai

NAT: F.IF.C.9

TOP: Comparing Quadratic Functions

716 ANS: 1

$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

PTS: 2

REF: 061423ai

NAT: A.CED.A.4

TOP: Transforming Formulas

717 ANS:

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

PTS: 2

REF: 011528ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: subtraction

718 ANS: 3

Median remains at 1.4.

PTS: 2

REF: 061520ai

NAT: S.ID.A.3

TOP: Central Tendency and Dispersion

719 ANS: 2

$$2(3x - y) = 4$$

$$6x - 2y = 8$$

PTS: 2

REF: 061414ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

720 ANS:

$$A = \frac{1}{2}h(b_1 + b_2) \quad b_1 = \frac{2(60)}{6} - 12 = 20 - 12 = 8$$

$$\frac{2A}{h} = b_1 + b_2$$

$$\frac{2A}{h} - b_2 = b_1$$

PTS: 4 REF: 081434ai NAT: A.CED.A.4 TOP: Transforming Formulas

721 ANS: 4

$$(x+2)^2 - 25 = 0$$

$$((x+2)+5)((x+2)-5) = 0$$

$$x = -7, 3$$

PTS: 2 REF: 081418ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

722 ANS: 4

$$m = \frac{11-1}{3-(-2)} = \frac{10}{5} = 2 \quad y = mx + b \quad y = 2x + 5$$

$$11 = 2(3) + b \quad 9 = 2(2) + 5$$

$$5 = b$$

PTS: 2 REF: 011511ai NAT: A.REI.D.10 TOP: Writing Linear Equations

KEY: other forms

723 ANS: 4 PTS: 2 REF: 081405ai NAT: A.REI.D.10

TOP: Identifying Solutions

724 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.  $x = \frac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2(1)} = \frac{-7 + \sqrt{101}}{2} \approx 1.5$

PTS: 6 REF: 081537ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

725 ANS: 4 PTS: 2 REF: 061406ai NAT: F.LE.A.1

TOP: Families of Functions

726 ANS:

g. The maximum of  $f$  is 6. For  $g$ , the maximum is 11.  $x = \frac{-b}{2a} = \frac{-4}{2\left(-\frac{1}{2}\right)} = \frac{-4}{-1} = 4$

$$y = -\frac{1}{2}(4)^2 + 4(4) + 3 = -8 + 16 + 3 = 11$$

PTS: 2 REF: 081429ai NAT: F.IF.C.9 TOP: Comparing Quadratic Functions

727 ANS:

$$m(x) = (3x - 1)(3 - x) + 4x^2 + 19 \quad x^2 + 10x + 16 = 0$$

$$m(x) = 9x - 3x^2 - 3 + x + 4x^2 + 19 \quad (x + 8)(x + 2) = 0$$

$$m(x) = x^2 + 10x + 16 \quad x = -8, -2$$

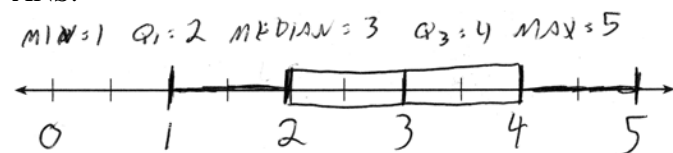
PTS: 4 REF: 061433ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

728 ANS: 3 PTS: 2 REF: 061411ai NAT: S.ID.C.8

TOP: Correlation Coefficient

729 ANS:



PTS: 2 REF: 061432ai NAT: S.ID.A.1 TOP: Box Plots

KEY: represent

730 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.

PTS: 2 REF: 011532ai NAT: F.LE.A.2 TOP: Modeling Exponential Functions

731 ANS: 1

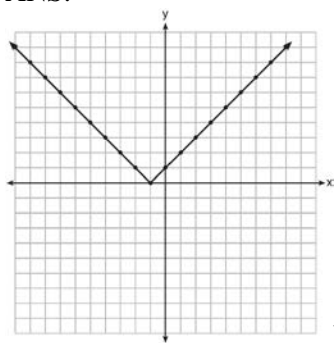
$$7 - \frac{2}{3}x < x - 8$$

$$15 < \frac{5}{3}x$$

$$9 < x$$

PTS: 2 REF: 011507ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

732 ANS:



Range:  $y \geq 0$ . The function is increasing for  $x > -1$ .

PTS: 4

REF: fall1310ai

NAT: F.IF.C.7

TOP: Graphing Absolute Value Functions

733 ANS:

$$x^2 + 6x + 9 = 41 + 9$$

$$(x + 3)^2 = 50$$

$$x + 3 = \pm\sqrt{50}$$

$$x = -3 \pm 5\sqrt{2}$$

PTS: 4

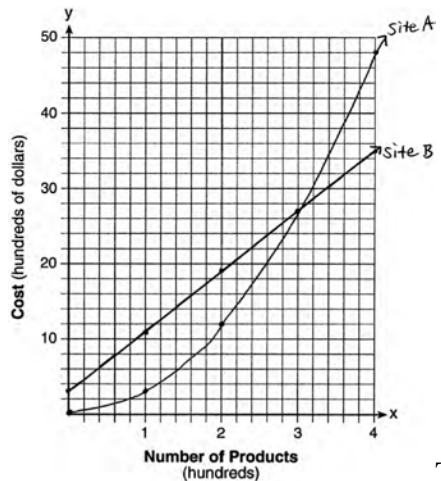
REF: fall2304ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

734 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  $x = 2$ .

PTS: 6

REF: 061437ai

NAT: A.REI.D.11

TOP: Quadratic-Linear Systems

735 ANS: 4

PTS: 2

REF: 011503ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: factoring

736 ANS:

 $A(n) = 175 - 2.75n$   $0 = 175 - 2.75n$  After 63 weeks, Caitlin will not have enough money to rent another movie.

$$2.75n = 175$$

$$n = 63.6$$

PTS: 4 REF: 061435ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

737 ANS: 4 PTS: 2 REF: 081508ai NAT: A.CED.A.2

TOP: Modeling Linear Equations

738 ANS: 3 PTS: 2 REF: 081507ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

739 ANS:

$$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16 \text{ None}$$

PTS: 2 REF: 081529ai NAT: A.REI.B.4 TOP: Using the Discriminant

740 ANS: 2 PTS: 2 REF: 081516ai NAT: F.IF.C.7

TOP: Graphing Piecewise-Defined Functions KEY: bimodalgraph

741 ANS:

$$(3x^2 - 2x + 5) - (x^2 + 3x - 2) = 2x^2 - 5x + 7$$

$$\frac{1}{2}x^2(2x^2 - 5x + 7) = x^4 - \frac{5}{2}x^3 + \frac{7}{2}x^2$$

PTS: 2 REF: 061528ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

742 ANS: 3

$$15 > 5$$

PTS: 2 REF: 081502ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

743 ANS: 3 PTS: 2 REF: 061409ai NAT: F.IF.B.4

TOP: Graphing Quadratic Functions KEY: key features

744 ANS:

$$4x^2 - 12x - 7 = 0$$

$$(4x^2 - 14x) + (2x - 7) = 0$$

$$2x(2x - 7) + (2x - 7) = 0$$

$$(2x + 1)(2x - 7) = 0$$

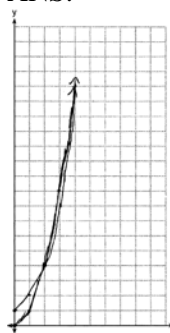
$$x = -\frac{1}{2}, \frac{7}{2}$$

PTS: 2 REF: 011529ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring



745 ANS:



$g(x)$  has a greater value:  $2^{20} > 20^2$

PTS: 4

REF: 081533ai

NAT: F.LE.A.3

TOP: Families of Functions

746 ANS: 3

PTS: 2

REF: 011522ai

NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: higher power

747 ANS: 3

PTS: 2

REF: 061412ai

NAT: A.APR.B.3

TOP: Zeros of Polynomials

748 ANS:

$$36 - 4x^2 = 4(9 - x^2) = 4(3 + x)(3 - x)$$

PTS: 2

REF: 012432ai

NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

749 ANS: 2

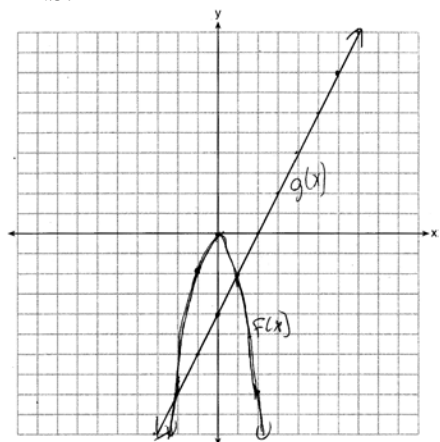
PTS: 2

REF: 081501ai

NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

750 ANS:



$x = -2, 1$

PTS: 4

REF: 081435ai

NAT: A.REI.D.11

TOP: Quadratic-Linear Systems

751 ANS:

$$-3x + 7 - 5x < 15 \quad 0 \text{ is the smallest integer.}$$

$$-8x < 8$$

$$x > -1$$

PTS: 2

REF: 061530ai

NAT: A.REI.B.3

TOP: Interpreting Solutions

752 ANS: 4

$$\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.$$

PTS: 2 REF: 081414ai NAT: F.IF.B.6 TOP: Rate of Change

753 ANS: 4 PTS: 2 REF: 011514ai NAT: S.ID.A.2

TOP: Central Tendency and Dispersion

754 ANS:

$$f(x) = 6.50x + 4(12)$$

PTS: 2 REF: 061526ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

755 ANS:

$$8x + 11y \geq 200 \quad 8x + 11(15) \geq 200$$

$$8x + 165 \geq 200$$

$$8x \geq 35$$

$$x \geq 4.375$$

5 hours

PTS: 4 REF: fall1309ai NAT: A.CED.A.3 TOP: Modeling Linear Inequalities

756 ANS: 3 PTS: 2 REF: 061504ai NAT: F.IF.A.1

TOP: Defining Functions

KEY: ordered pairs

757 ANS: 1

$$\frac{110 - 40}{2 - 1} > \frac{350 - 230}{8 - 6}$$

$$70 > 60$$

PTS: 2 REF: 061418ai NAT: F.IF.B.6 TOP: Rate of Change

758 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.  $(x - 3)(2x) = 1.25x^2$   $1.25(8)^2 = 80$

$$2x^2 - 6x = 1.25x^2$$

$$.75x^2 - 6x = 0$$

$$x^2 - 8x = 0$$

$$x(x - 8) = 0$$

$$x = 8$$

PTS: 6 REF: 011537ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

759 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.

PTS: 2 REF: 061527ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

760 ANS: 3 PTS: 2 REF: spr1302ai NAT: A.REI.B.4

TOP: Solving Quadratics KEY: graph

761 ANS: 2

$(4, 3)$  is on the boundary of  $y > -\frac{1}{2}x + 5$ , so  $(4, 3)$  is not a solution of the system.

PTS: 2 REF: fall1301ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: solution set

762 ANS:

$$12x + 9(2x) + 5(3x) = 15 \cdot 6 \left( \frac{1}{3} \right) = 2 \text{ pounds}$$

$$45x = 15$$

$$x = \frac{1}{3}$$

PTS: 2 REF: spr1305ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

763 ANS: 4

$$x^2 - 5x = -3$$

$$x^2 - 5x + \frac{25}{4} = \frac{-12}{4} + \frac{25}{4}$$

$$\left( x - \frac{5}{2} \right)^2 = \frac{13}{4}$$

PTS: 2 REF: 061518ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

764 ANS: 2 PTS: 2 REF: 011502ai NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

765 ANS: 3 PTS: 2 REF: 081506ai NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph

766 ANS: 4 PTS: 2 REF: 081503ai NAT: A.SSE.A.1

TOP: Modeling Expressions

767 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

PTS: 2 REF: 081404ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

768 ANS: 2

$$d = \frac{1}{2} at^2$$

$$2d = at^2$$

$$\frac{2d}{a} = t^2$$

$$\sqrt{\frac{2d}{a}} = t$$

PTS: 2 REF: 061519ai NAT: A.CED.A.4 TOP: Transforming Formulas

769 ANS: 2 PTS: 2 REF: 061403ai NAT: A.APR.A.1

TOP: Operations with Polynomials KEY: subtraction

770 ANS: 3 PTS: 2 REF: 081403ai NAT: A.REI.B.4

TOP: Solving Quadratics KEY: taking square roots

771 ANS: 4 PTS: 2 REF: 081421ai NAT: S.ID.B.6

TOP: Regression KEY: linear

772 ANS: 2 PTS: 2 REF: 061513ai NAT: F.LE.A.2

TOP: Families of Functions

773 ANS:

$$\frac{33 + 12}{180} = 25\%$$

PTS: 2 REF: 011526ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

774 ANS:

$$\frac{3}{2\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{3\sqrt{6}}{12}$$

PTS: 2 REF: fall2303ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: division

775 ANS: 1

$$x^2 - 8x + 16 = 24 + 16$$

$$(x - 4)^2 = 40$$

$$x - 4 = \pm\sqrt{40}$$

$$x = 4 \pm 2\sqrt{10}$$

PTS: 2

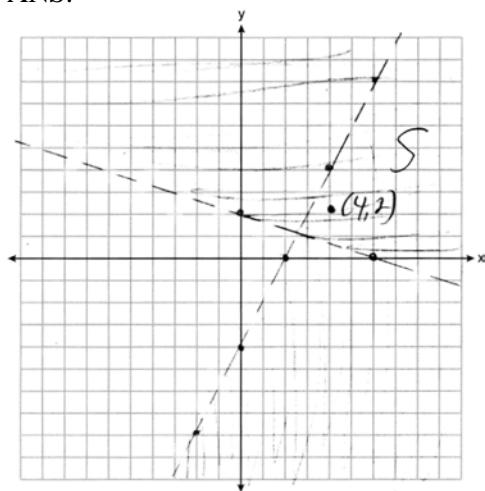
REF: 061523ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

776 ANS:



Yes, as (4,2) falls within S.

PTS: 4

REF: 012436ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

777 ANS:

$$15x + 36 = 10x + 48$$

$$5x = 12$$

$$x = 2.4$$

PTS: 2

REF: 011531ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

778 ANS: 3

PTS: 2

REF: 081412ai

NAT: F.LE.A.1

TOP: Families of Functions

779 ANS: 1

$$x^2 - 6x = 19$$

$$x^2 - 6x + 9 = 19 + 9$$

$$(x - 3)^2 = 28$$

$$x - 3 = \pm\sqrt{4 \cdot 7}$$

$$x = 3 \pm 2\sqrt{7}$$

PTS: 2

REF: fall1302ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: quadratic formula

780 ANS: 4                   PTS: 2                   REF: 081505ai           NAT: A.CED.A.1  
TOP: Modeling Linear Inequalities

781 ANS: 1

$$\frac{x-2}{3} = \frac{4}{6}$$

$$6x - 12 = 12$$

$$6x = 24$$

$$x = 4$$

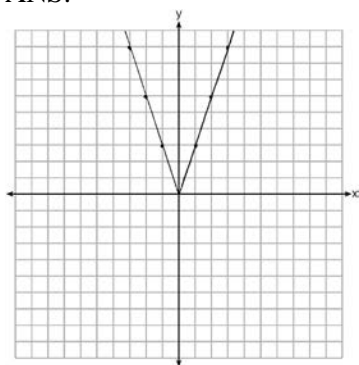
PTS: 2                   REF: 081420ai           NAT: A.REI.B.3           TOP: Solving Linear Equations

KEY: fractional expressions

782 ANS: 3                   PTS: 2                   REF: 061415ai           NAT: F.LE.A.2

TOP: Families of Functions

783 ANS:



2 down. 4 right.

PTS: 4                   REF: 081433ai           NAT: F.BF.B.3           TOP: Graphing Absolute Value Functions

784 ANS: 4

$$x^2 + 6x = 7$$

$$x^2 + 6x + 9 = 7 + 9$$

$$(x+3)^2 = 16$$

PTS: 2                   REF: 011517ai           NAT: A.REI.B.4           TOP: Solving Quadratics

KEY: completing the square

785 ANS: 2                   PTS: 2                   REF: 081422ai           NAT: F.IF.C.7

TOP: Graphing Piecewise-Defined Functions

786 ANS:

$$8m^2 + 20m - 12 = 0$$

$$4(2m^2 + 5m - 3) = 0$$

$$(2m - 1)(m + 3) = 0$$

$$m = \frac{1}{2}, -3$$

PTS: 2 REF: fall1305ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: factoring

787 ANS: 3

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

PTS: 2 REF: 061511ai NAT: F.IF.B.6 TOP: Rate of Change

788 ANS: 2 PTS: 2 REF: 061516ai NAT: S.ID.C.9

TOP: Analysis of Data

789 ANS: 4 PTS: 2 REF: 061502ai NAT: F.IF.B.4

TOP: Relating Graphs to Events

790 ANS: 3 PTS: 2 REF: 081509ai NAT: A.SSE.A.2

TOP: Factoring Polynomials KEY: quadratic

791 ANS:

$r \approx 0.94$ . The correlation coefficient suggests that as calories increase, so does sodium.

PTS: 4 REF: 011535ai NAT: S.ID.C.8 TOP: Correlation Coefficient

792 ANS: 1 PTS: 2 REF: 061420ai NAT: F.IF.A.2

TOP: Functional Notation

793 ANS:

$$(2x^2 + 7x - 10)(x + 5)$$

$$2x^3 + 7x^2 - 10x + 10x^2 + 35x - 50$$

$$2x^3 + 17x^2 + 25x - 50$$

PTS: 2 REF: 081428ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

794 ANS: 2 PTS: 2 REF: 011512ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

795 ANS: 1 PTS: 2 REF: fall2301ai NAT: N.RN.B.3

TOP: Operations with Radicals KEY: addition

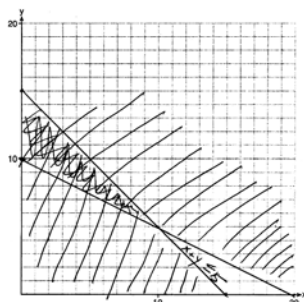
796 ANS:

$y = 0.16x + 8.27$   $r = 0.97$ , which suggests a strong association.

PTS: 4 REF: 081536ai NAT: S.ID.B.6 TOP: Regression

KEY: linear with correlation coefficient

797 ANS:



$x + y \leq 15$  One hour at school and eleven hours at the library.

$$4x + 8y \geq 80$$

PTS: 6 REF: 081437ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

798 ANS: 3

$\sqrt{16} + \sqrt{9} = \frac{7}{1}$  may be expressed as the ratio of two integers.

PTS: 2 REF: 061413ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

799 ANS: 3

$$\frac{\sqrt{2\left(\frac{1}{2}\right)+3}}{6\left(\frac{1}{2}\right)-5} = \frac{\sqrt{4}}{-2} = \frac{2}{-2} = -1$$

PTS: 2 REF: 081512ai NAT: F.IF.A.2 TOP: Functional Notation

800 ANS:

The vertex represents a maximum since  $a < 0$ .  $f(x) = -x^2 + 8x + 9$

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

$$= -(x^2 - 8x + 16) + 9 + 16$$

$$= -(x - 4)^2 + 25$$

PTS: 4 REF: 011536ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic



801 ANS:

$$24x + 27y = 144 \quad -8.5y = -51 \quad \text{Agree, as both systems have the same solution.}$$

$$24x + 10y = 42 \quad y = 6$$

$$17y = 102 \quad 8x + 9(6) = 48$$

$$y = 6 \quad 8x = -6$$

$$8x + 9(6) = 48 \quad x = -\frac{3}{4}$$

$$8x = -6$$

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

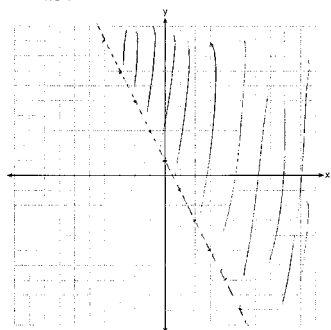
PTS: 4

REF: 061533ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

802 ANS:



PTS: 2

REF: 081526ai

NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

803 ANS: 2

$$x^2 - 6x = 12$$

$$x^2 - 6x + 9 = 12 + 9$$

$$(x - 3)^2 = 21$$

PTS: 2

REF: 061408ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: completing the square

804 ANS: 1

$$x^2 - 12x + 7$$

$$x^2 - 12x + 36 - 29$$

$$(x - 6)^2 - 29$$

PTS: 2

REF: 081520ai

NAT: F.IF.C.8

TOP: Vertex Form of a Quadratic

805 ANS: 1

PTS: 2

REF: 061521ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: taking square roots

806 ANS:

a)  $p + d \leq 800$  b)  $6(440) + 9d \geq 5000$  Since  $440 + 263 \leq 800$ , it is possible.

$$6p + 9d \geq 5000 \quad 2640 + 9d \geq 5000$$

$$9d \geq 2360$$

$$d \geq 262.\bar{2}$$

PTS: 2 REF: spr1306ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

807 ANS: 3 PTS: 2 REF: 011505ai NAT: F.LE.A.1

TOP: Families of Functions

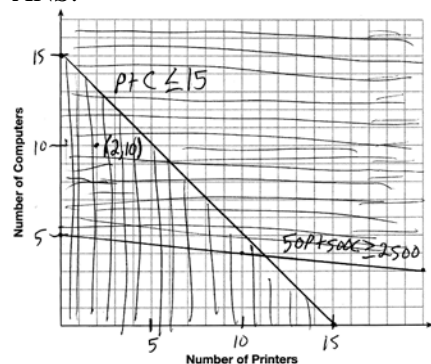
808 ANS: 4 PTS: 2 REF: 011523ai NAT: F.BF.A.1

TOP: Modeling Linear Functions

809 ANS: 2 PTS: 2 REF: 061508ai NAT: N.RN.B.3

TOP: Operations with Radicals KEY: classify

810 ANS:



A combination of 2 printers and 10 computers meets all the constraints because  $(2, 10)$  is in the solution set of the graph.

PTS: 4 REF: 061535ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

811 ANS: 4

$$3x^2 - 3x - 6 = 0$$

$$3(x^2 - x - 2) = 0$$

$$3(x - 2)(x + 1) = 0$$

$$x = 2, -1$$

PTS: 2 REF: 081513ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

812 ANS:

$$h(n) = 1.5(n - 1) + 3$$

PTS: 2 REF: 081525ai NAT: F.LE.A.2 TOP: Modeling Linear Functions

813 ANS: 1

$$\frac{7}{3} \left( x + \frac{9}{28} \right) = 20$$

$$\frac{7}{3}x + \frac{3}{4} = \frac{80}{4}$$

$$\frac{7}{3}x = \frac{77}{4}$$

$$x = \frac{33}{4} = 8.25$$

PTS: 2                      REF: 061405ai                      NAT: A.REI.B.3                      TOP: Solving Linear Equations  
KEY: fractional expressions

814 ANS:

Since  $(x+p)^2 = x^2 + 2px + p^2$ ,  $p$  is half the coefficient of  $x$ , and the constant term is equal to  $p^2$ .  $\left(\frac{6}{2}\right)^2 = 9$

PTS: 2                      REF: 081432ai                      NAT: A.REI.B.4                      TOP: Solving Quadratics  
KEY: completing the square

815 ANS: 1                      PTS: 2                      REF: 011504ai                      NAT: F.BF.A.1  
TOP: Modeling Exponential Functions

816 ANS: 3                      PTS: 2                      REF: 011513ai                      NAT: A.CED.A.1  
TOP: Modeling Linear Inequalities

817 ANS: 2

$$P(x) = -0.5x^2 + 800x - 100 - (300x + 250) = -0.5x^2 + 500x - 350$$

PTS: 2                      REF: 081406ai                      NAT: F.BF.A.1                      TOP: Operations with Functions

818 ANS: 4

$\frac{1}{3}$  of a positive number +9 is a positive number.

PTS: 2                      REF: 061417ai                      NAT: F.IF.A.2                      TOP: Domain and Range  
KEY: real domain, linear

819 ANS:

Exponential, because the function does not grow at a constant rate.

PTS: 2                      REF: 081527ai                      NAT: F.LE.A.1                      TOP: Families of Functions

820 ANS:

$$y = 40.48x + 363.81, \quad 0.84, \text{ strong}$$

PTS: 4                      REF: 012434ai                      NAT: S.ID.B.6                      TOP: Regression  
KEY: linear with correlation coefficient

821 ANS: 3                      PTS: 2                      REF: 011515ai                      NAT: F.LE.B.5  
TOP: Modeling Exponential Functions

822 ANS: 1

$$f(2) = 0$$

$$f(6) = 8$$

PTS: 2 REF: 081411ai NAT: F.IF.A.2 TOP: Domain and Range

KEY: limited domain

823 ANS:

$$2(-1) + a(-1) - 7 > -12 \quad a = 2$$

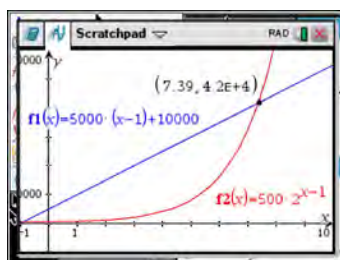
$$-a - 9 > -12$$

$$-a > -3$$

$$a < 3$$

PTS: 2 REF: 061427ai NAT: A.REI.B.3 TOP: Interpreting Solutions

824 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

PTS: 2 REF: 081518ai NAT: F.LE.A.3 TOP: Families of Functions

825 ANS: 2 PTS: 2 REF: 081413ai NAT: A.CED.A.2

TOP: Graphing Linear Functions KEY: bimodalgraph

826 ANS: 3

$$a + p = 165 \quad 1.75(165 - p) + 2.5p = 337.5$$

$$1.75a + 2.5p = 337.5 \quad 288.75 - 1.75p + 2.5p = 337.5$$

$$0.75p = 48.75$$

$$p = 65$$

PTS: 2 REF: 061506ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

827 ANS: 2

$$(x + 4)(x + 6) = 0$$

$$x^2 + 10x + 24 = 0$$

PTS: 2 REF: spr1303ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

828 ANS:

$$w(w + 40) = 6000$$

$$w^2 + 40w - 6000 = 0$$

$$(w + 100)(w - 60) = 0$$

$$w = 60, l = 100$$

PTS: 4 REF: 081436ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

829 ANS: 2 PTS: 2 REF: 011501ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

830 ANS: 4 PTS: 2 REF: 061422ai NAT: A.CED.A.2

TOP: Modeling Linear Equations

831 ANS:

$$x^4 + 6x^2 - 7$$

$$(x^2 + 7)(x^2 - 1)$$

$$(x^2 + 7)(x + 1)(x - 1)$$

PTS: 2 REF: 061431ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: higher power

832 ANS:

$$y = 0.05x - 0.92$$

PTS: 2 REF: fall1307ai NAT: S.ID.B.6 TOP: Regression

KEY: linear

833 ANS:

 $7x - 3(4x - 8) \leq 6x + 12 - 9x$  6, 7, 8 are the numbers greater than or equal to 6 in the interval.

$$7x - 12x + 24 \leq -3x + 12$$

$$-5x + 24 \leq -3x + 12$$

$$12 \leq 2x$$

$$6 \leq x$$

PTS: 4 REF: 081534ai NAT: A.REI.B.3 TOP: Interpreting Solutions

834 ANS: 1 PTS: 2 REF: 061505ai NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

835 ANS: 4

$$16^{2t} = n^{4t}$$

$$(16^2)^t = (n^4)^t$$

$$((4^2)^2)^t = ((n^2)^2)^t$$

PTS: 2 REF: 011519ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

836 ANS:

 $-16t^2 + 64t = 0 \quad 0 \leq t \leq 4$  The rocket launches at  $t = 0$  and lands at  $t = 4$ .

$$-16t(t - 4) = 0$$

$$t = 0, 4$$

PTS: 2 REF: 081531ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: key features

837 ANS:

$$x(2x + 4) = 96 \quad 2x^2 + 4x - 96 = 0 \quad 2(6) + 4 = 16$$

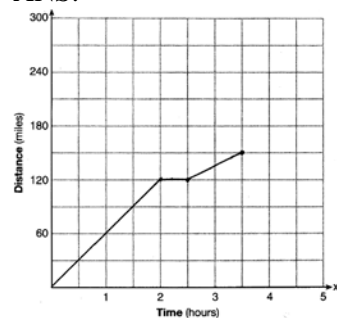
$$x^2 + 2x - 48 = 0 \quad 16 - 6 = 10$$

$$(x + 8)(x - 6) = 0$$

$$x = 6$$

PTS: 4 REF: 012435ai NAT: A.CED.A.1 TOP: Modeling Quadratics

838 ANS:



PTS: 2 REF: 081528ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

839 ANS: 2 PTS: 2 REF: 081511ai NAT: F.IF.A.1

TOP: Defining Functions KEY: mixed

840 ANS: 2 PTS: 2 REF: 061517ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

841 ANS: 1

A:  $\bar{x} = 6$ ;  $\sigma_x = 3.16$  B:  $\bar{x} = 6.875$ ;  $\sigma_x = 3.06$ 

PTS: 2 REF: 081519ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

842 ANS: 3 PTS: 2 REF: 061501ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

843 ANS: 1 PTS: 2 REF: 081407ai NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities KEY: solution set

844 ANS:

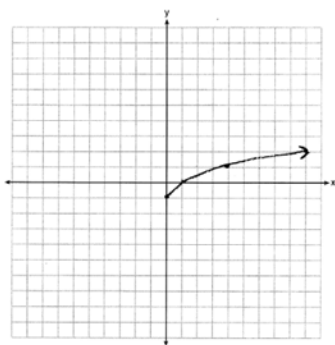
$$A = 600(1.016)^2 \approx 619.35$$

PTS: 2 REF: 061529ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

845 ANS: 2 PTS: 2 REF: 011506ai NAT: F.IF.B.5

TOP: Domain and Range KEY: context

846 ANS:



PTS: 2 REF: 061425ai NAT: F.IF.C.7 TOP: Graphing Root Functions

847 ANS: 4

$$m = \frac{7-3}{2-(-1)} = \frac{4}{3}$$

PTS: 2 REF: fall2302ai NAT: A.REI.D.10 TOP: Writing Linear Equations

KEY: other forms

848 ANS:

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h} \quad d = 2\sqrt{\frac{66}{3.3\pi}} \approx 5$$

$$\frac{V}{\pi h} = r^2$$

$$\sqrt{\frac{V}{\pi h}} = r$$

PTS: 4 REF: 081535ai NAT: A.CED.A.4 TOP: Transforming Formulas

849 ANS: 4

Over the interval  $0 \leq x \leq 3$ , the average rate of change for  $h(x) = \frac{9-2}{3-0} = \frac{7}{3}$ ,  $f(x) = \frac{7-1}{3-0} = \frac{6}{3} = 2$ , and

$$g(x) = \frac{3-0}{3-0} = \frac{3}{3} = 1.$$

PTS: 2 REF: spr1301ai NAT: F.IF.B.6 TOP: Rate of Change

850 ANS:

$(-4, 1)$ , because then every element of the domain is not assigned one unique element in the range.

PTS: 2 REF: 011527ai NAT: F.IF.A.1 TOP: Defining Functions

KEY: ordered pairs

851 ANS: 3 PTS: 2 REF: 081409ai NAT: A.CED.A.1

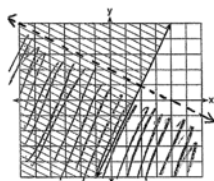
TOP: Modeling Quadratics

852 ANS: 1

$$25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60$$

PTS: 2 REF: 011508ai NAT: F.IF.A.2 TOP: Functional Notation

853 ANS:



$$y \geq 2x - 3.$$

Oscar is wrong.  $(2) + 2(1) < 4$  is not true.

PTS: 4

REF: 011534ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

KEY: graph

854 ANS:

$$2p + 3d = 18.25 \quad 4p + 6d = 36.50 \quad 4p + 2(2.25) = 27.50$$

$$4p + 2d = 27.50 \quad 4p + 2d = 27.50 \quad 4p = 23$$

$$4d = 9 \quad p = 5.75$$

$$d = 2.25$$

PTS: 4

REF: 011533ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems

855 ANS: 1

PTS: 2

REF: 061507ai

NAT: F.IF.C.7

TOP: Graphing Step Functions

KEY: bimodalgraph

856 ANS: 4

$$1) \frac{g(1) - g(-1)}{1 - (-1)} = \frac{4 - 6}{2} = \frac{-2}{2} = -1 \quad 2) g(0) = 6 \quad 3) x = \frac{-(-1)}{2(-1)} = -\frac{1}{2}; g\left(-\frac{1}{2}\right) = -\left(-\frac{1}{2}\right)^2 + \frac{1}{2} + 6 = 6\frac{1}{4}$$

$$\frac{n(1) - n(-1)}{1 - (-1)} = \frac{9 - 5}{2} = \frac{4}{2} = 2 \quad n(0) = 8 \quad x = 1; n(1) = 9$$

$$4) g: S = \frac{-(-1)}{-1} = -1$$

$$n: S = -2 + 4 = 2$$

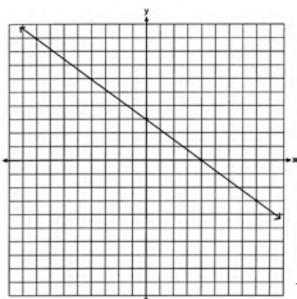
PTS: 2

REF: 081521ai

NAT: F.IF.C.9

TOP: Comparing Quadratic Functions

857 ANS:

No, because  $(3, 2)$  is not on the graph.

PTS: 2

REF: 061429ai

NAT: F.IF.B.4

TOP: Graphing Linear Functions

858 ANS:

$$x^2 + 10x + 24 = (x + 4)(x + 6) = (x + 6)(x + 4). \quad 6 \text{ and } 4$$

PTS: 2

REF: 081425ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: factoring



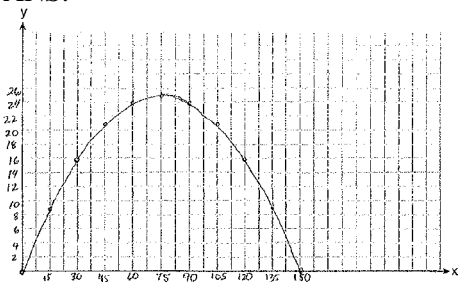
859 ANS: 4 PTS: 2 REF: 061509ai NAT: F.IF.B.5  
TOP: Domain and Range KEY: graph

860 ANS:

$$f(3) = -(3)^2 + 15 = 6$$

PTS: 2 REF: 012430ai NAT: F.IF.A.2 TOP: Functional Notation

861 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  $y = -\frac{1}{225}(135)^2 + \frac{2}{3}(135) = -81 + 90 = 9$

PTS: 6 REF: 061537ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: graph

862 ANS:

$$\begin{aligned} n + q &= 28 & .05(28 - q) + .25q &= 4 & n + 13 &= 28 & .25x + .05x &= 3 \\ .05n + .25q &= 4 & 1.4 - .05q + .25q &= 4 & n &= 15 & .3x &= 3 \\ & & .2q &= 2.6 & & & x &= 10 \\ & & q &= 13 & & & & \end{aligned}$$

PTS: 6 REF: 012437ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

863 ANS:

$$\begin{aligned} 185 + 0.03x &= 275 + 0.025x \\ 0.005x &= 90 \\ x &= 18000 \end{aligned}$$

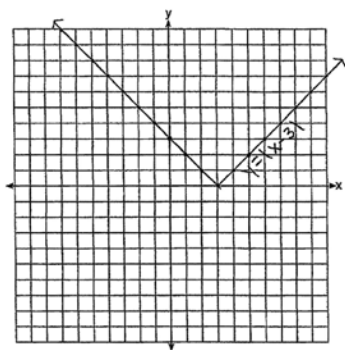
PTS: 2 REF: 081427ai NAT: A.REI.C.6 TOP: Solving Linear Systems  
KEY: substitution

864 ANS: 3

	Mean	Q1	Median	Q3	IQR
Semester 1	86.8	80.5	88	92.5	12
Semester 2	87	80	88	92	12

PTS: 2 REF: 061419ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

865 ANS:



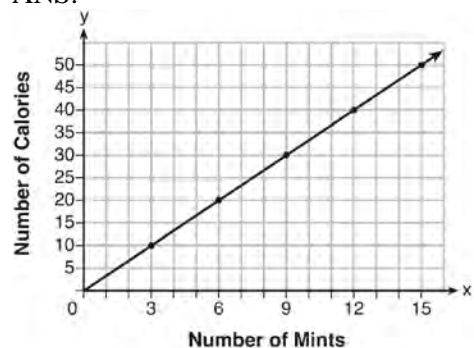
The graph has shifted three units to the right.

PTS: 2 REF: 061525ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

866 ANS: 1 PTS: 2 REF: 081417ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

867 ANS:



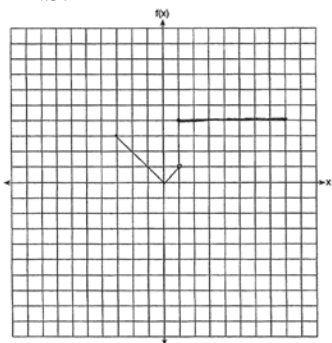
$$C(x) = \frac{10}{3}x \quad 180 = \frac{10}{3}x$$

$$540 = 10x$$

$$54 = x$$

PTS: 4 REF: fall1308ai NAT: A.CED.A.2 TOP: Graphing Linear Functions

868 ANS:



PTS: 2 REF: 011530ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

869 ANS: 4 PTS: 2 REF: 081419ai NAT: A.CED.A.3

TOP: Modeling Linear Systems

870 ANS: 2 PTS: 2 REF: 011510ai NAT: A.APR.A.1

TOP: Operations with Polynomials KEY: multiplication

871 ANS:

$$\frac{1}{2}x^2 - 4 = 0$$

$$x^2 - 8 = 0$$

$$x^2 = 8$$

$$x = \pm 2\sqrt{2}$$

PTS: 2 REF: fall1306ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: taking square roots

872 ANS:

$$x^2 + 5x - 17 = x - 5 \quad -6 - y = 5 \quad 2 - y = 5 \quad (-6, -11), (2, -3)$$

$$x^2 + 4x - 12 = 0 \quad y = -11 \quad y = -3$$

$$(x + 6)(x - 2) = 0$$

$$x = -6, 2$$

PTS: 4 REF: fall2305ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

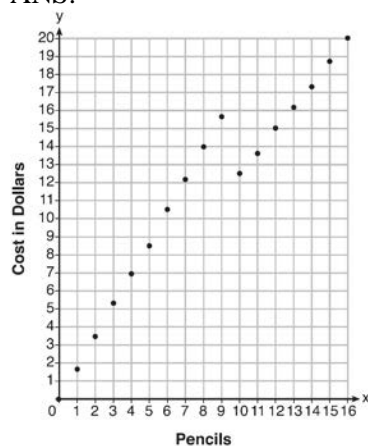
873 ANS:

Yes, because every element of the domain is assigned one unique element in the range.

PTS: 2 REF: 061430ai NAT: F.IF.A.1 TOP: Defining Functions

KEY: ordered pairs

874 ANS:



Since according to the graph, 8 pencils cost \$14 and 10 pencils cost \$12.50, the cashier is correct.

PTS: 4 REF: fall1312ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

875 ANS:

$$2.35c + 5.50d = 89.50 \quad \text{Pat's numbers are not possible: } 2.35(8) + 5.50(14) \neq 89.50 \quad c + d = 22$$

$$18.80 + 77.00 \neq 89.50 \quad 2.35c + 5.50(22 - c) = 89.50$$

$$95.80 \neq 89.50 \quad 2.35c + 121 - 5.50c = 89.50$$

$$-3.15c = -31.50$$

$$c = 10$$

PTS: 4 REF: 061436ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

876 ANS: 1

$$\text{I. } -\frac{5}{8} + \frac{3}{5} = \frac{-1}{40}; \quad \text{III. } (\sqrt{5}) \cdot (\sqrt{5}) = \frac{5}{1}; \quad \text{IV. } 3 \cdot (\sqrt{49}) = \frac{21}{1}$$

PTS: 2 REF: 011604ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

877 ANS: 4

$$3(x^2 - 4x + 4) - 2x + 2 = 3x^2 - 12x + 12 - 2x + 2 = 3x^2 - 14x + 14$$

PTS: 2 REF: 081524ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

878 ANS:

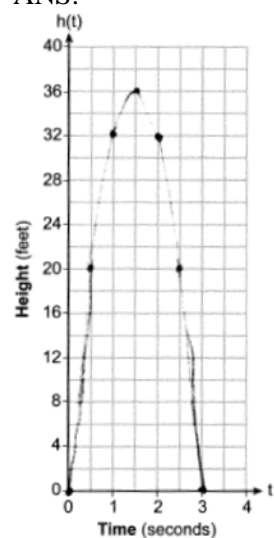
$$x^2 - 8x + 16 = -41 + 16$$

$$(x - 4)^2 = -25$$

PTS: 2 REF: 012431ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

879 ANS:



36, 3

PTS: 4 REF: 012433ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: graph

- 880 ANS: 1                   PTS: 2                   REF: 011516ai           NAT: A.CED.A.4  
TOP: Transforming Formulas
- 881 ANS: 3                   PTS: 2                   REF: 081523ai           NAT: A.REI.B.4  
TOP: Solving Quadratics           KEY: taking square roots
- 882 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.  
 $B(x) = 2x + 2.50$             $.50x = 3.50$             $B(x) = 2(5) + 2.50 = 12.50$   
 $x = 7$
- PTS: 6                   REF: spr1308ai           NAT: A.REI.C.6           TOP: Graphing Linear Systems
- 883 ANS: 4  
 $x^2 - 13x - 30 = 0$   
 $(x - 15)(x + 2) = 0$   
 $x = 15, -2$
- PTS: 2                   REF: 061510ai           NAT: A.APR.B.3           TOP: Zeros of Polynomials
- 884 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.
- PTS: 2                   REF: 081530ai           NAT: F.LE.B.5           TOP: Modeling Exponential Functions
- 885 ANS:  
6.  $3x + 9 \leq 5x - 3$   
 $12 \leq 2x$   
 $6 \leq x$
- PTS: 2                   REF: 081430ai           NAT: A.REI.B.3           TOP: Interpreting Solutions
- 886 ANS: 2                   PTS: 2                   REF: 061416ai           NAT: A.CED.A.1  
TOP: Modeling Linear Equations
- 887 ANS: 1                   PTS: 2                   REF: 081415ai           NAT: A.SSE.A.2  
TOP: Factoring Polynomials           KEY: higher power
- 888 ANS: 2  
 $x^2 - 2x - 8 = \frac{1}{4}x - 1$   
 $4x^2 - 8x - 32 = x - 4$   
 $4x^2 - 9x - 28 = 0$   
 $(4x + 7)(x - 4) = 0$   
 $x = -\frac{7}{4}, 4$
- PTS: 2                   REF: 081517ai           NAT: A.REI.D.11           TOP: Quadratic-Linear Systems

889 ANS:

$$B = 3000(1.042)^t$$

PTS: 2

REF: 081426ai

NAT: F.BF.A.1

TOP: Modeling Exponential Functions

890 ANS: 3

PTS: 2

REF: 061407ai

NAT: F.LE.B.5

TOP: Modeling Linear Functions

891 ANS: 1

PTS: 2

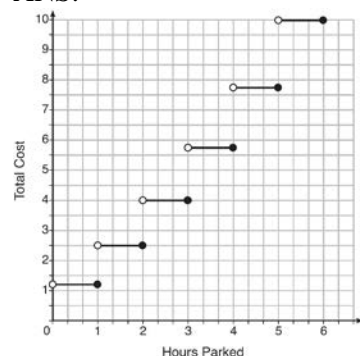
REF: 081401ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: classify

892 ANS:



The cost for each additional hour increases after the first 2 hours.

PTS: 4

REF: fall1311ai

NAT: F.IF.C.7

TOP: Graphing Step Functions

893 ANS: 4

There are no negative or fractional cars.

PTS: 2

REF: 061402ai

NAT: F.IF.B.5

TOP: Domain and Range

KEY: context

894 ANS: 1

$$4x - 5(0) = 40$$

$$4x = 40$$

$$x = 10$$

PTS: 2

REF: 081408ai

NAT: F.IF.B.4

TOP: Graphing Linear Functions