

# JMAP

# REGENTS AT RANDOM

NY Algebra I Regents Exam Questions  
from Spring 2013 to June 2021 Sorted at Random

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**Algebra I Regents at Random**

- 1 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.

- 2 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*.)

- 3 In the functions  $f(x) = kx^2$  and  $g(x) = |kx|$ ,  $k$  is a positive integer. If  $k$  is replaced by  $\frac{1}{2}$ , which statement about these new functions is true?
- 1) The graphs of both  $f(x)$  and  $g(x)$  become wider.
  - 2) The graph of  $f(x)$  becomes narrower and the graph of  $g(x)$  shifts left.
  - 3) The graphs of both  $f(x)$  and  $g(x)$  shift vertically.
  - 4) The graph of  $f(x)$  shifts left and the graph of  $g(x)$  becomes wider.
- 4 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)  $V = 15,000(0.9)^{\frac{t}{2}}$

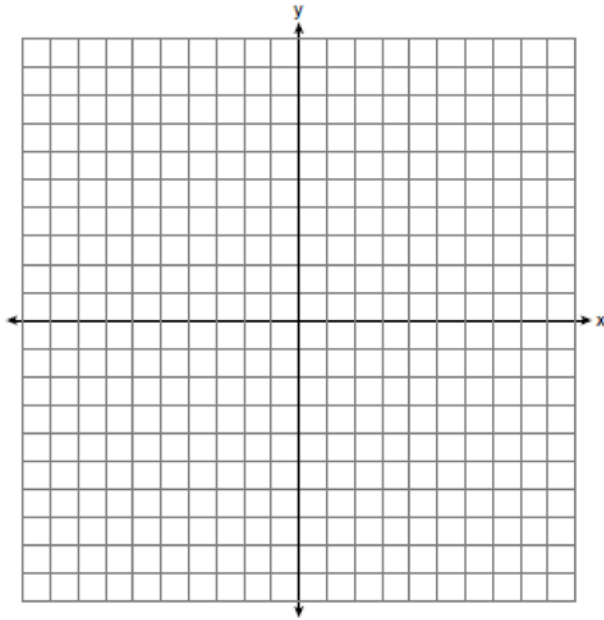


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- 9 If the function  $f(x) = x^2$  has the domain  $\{0, 1, 4, 9\}$ , what is its range?
- 1)  $\{0, 1, 2, 3\}$
  - 2)  $\{0, 1, 16, 81\}$
  - 3)  $\{0, -1, 1, -2, 2, -3, 3\}$
  - 4)  $\{0, -1, 1, -16, 16, -81, 81\}$
- 10 Which value of  $x$  satisfies the equation  $\frac{5}{6} \left( \frac{3}{8} - x \right) = 16$ ?
- 1)  $-19.575$
  - 2)  $-18.825$
  - 3)  $-16.3125$
  - 4)  $-15.6875$
- 11 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)  $\{-2, -1, 0, 0, 1, 1, 1, 2, 4, 4\}$
- 12 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)  $y = (x - 12)^2 + 126$
- 13 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)  $f(x) = 3(x + 2)^2 + 7$
- 14 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
- 15 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)  $300^{2t} \cdot 2^{2t}$
- 16 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.
- 17 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  $B$

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

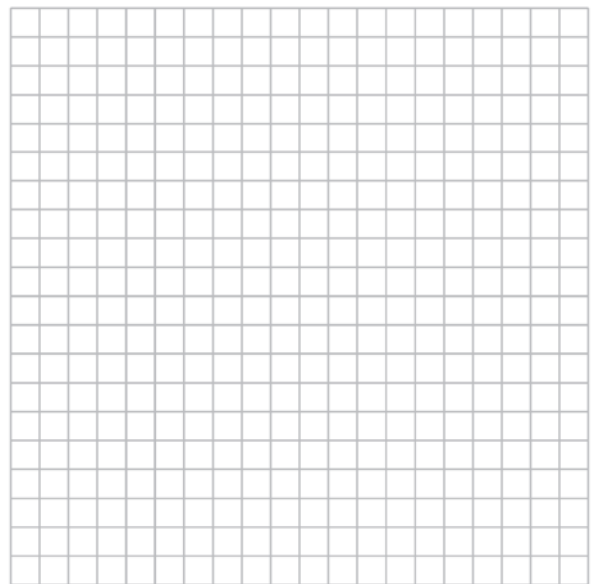


- 19 During the 2010 season, football player McGee's earnings,  $m$ , were 0.005 million dollars more than those of his teammate Fitzpatrick's earnings,  $f$ . The two players earned a total of 3.95 million dollars. Which system of equations could be used to determine the amount each player earned, in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

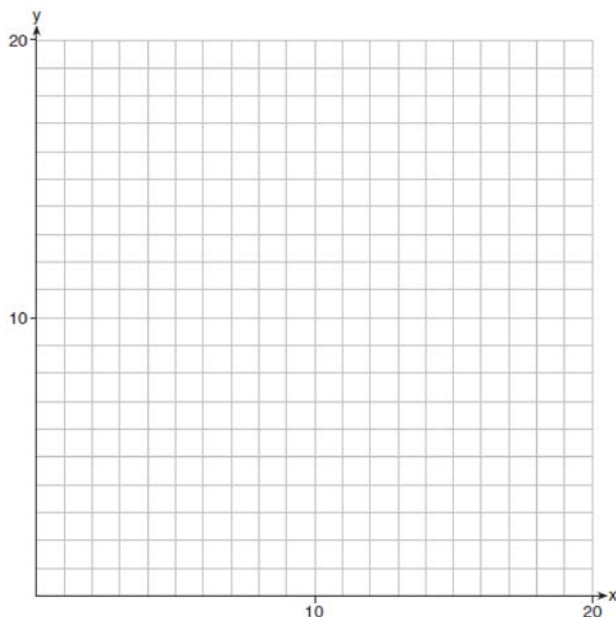
- 20 Write the expression  $5x + 4x^2(2x + 7) - 6x^2 - 9x$  as a polynomial in standard form.

- 21 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.



- 22 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)  $0 = 2x(x - 1) - 3(x + 1)$

- 23 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.

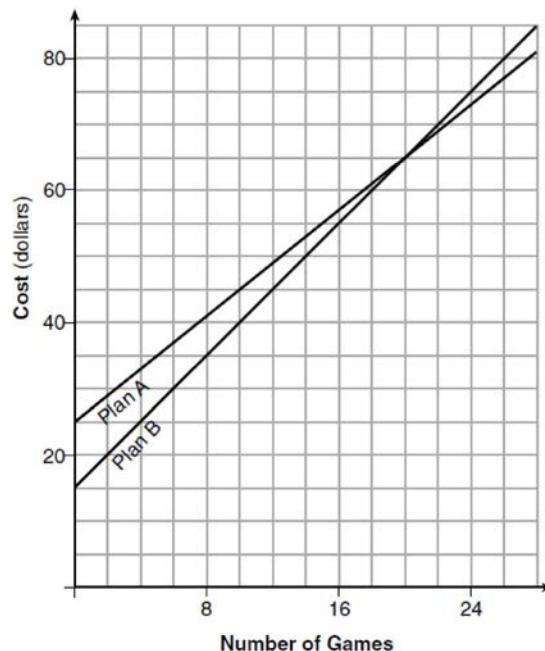


Determine and state one combination of hours that will allow Edith to earn *at least* \$80 per week while working *no more than* 15 hours.

- 24 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

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

- 26 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.

- 27 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.

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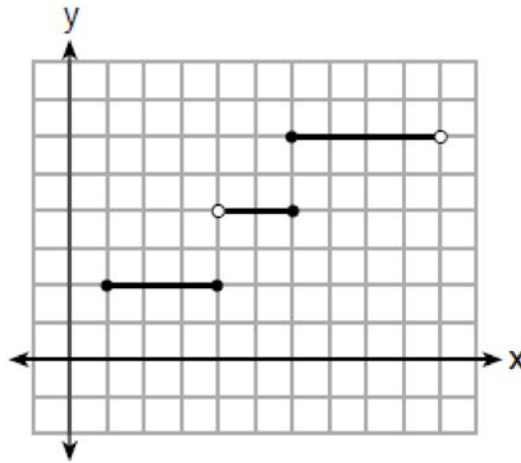
28 The table below shows 6 students' overall averages and their averages in their math class.

<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  $0.5$ .

29 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

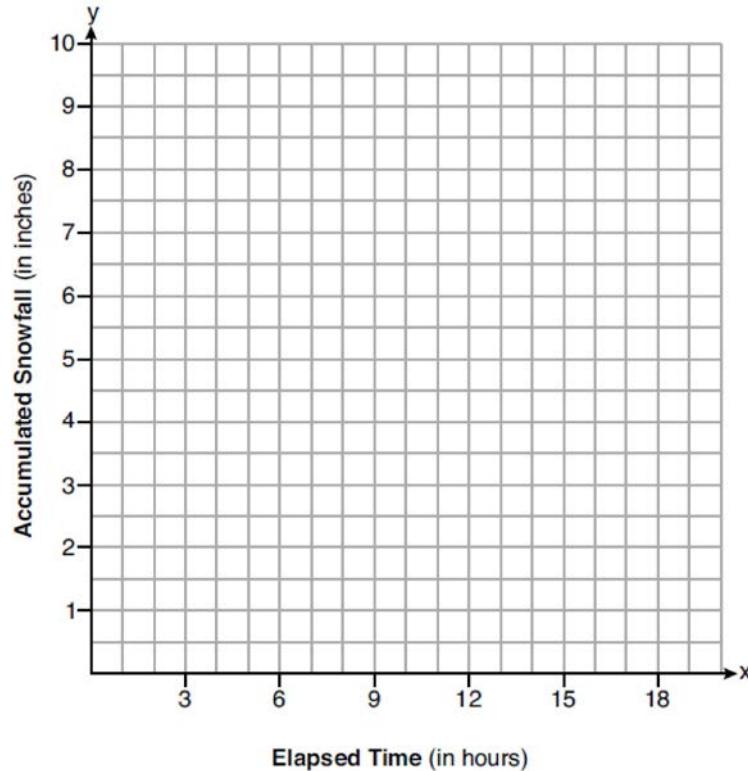
**III**

$$y = x^2$$

**IV**

State which relation(s) are functions. Explain why the other relation(s) are *not* functions.

- 30 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*.

- 31 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.
- 32 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)  $a_n = 16n - 38$

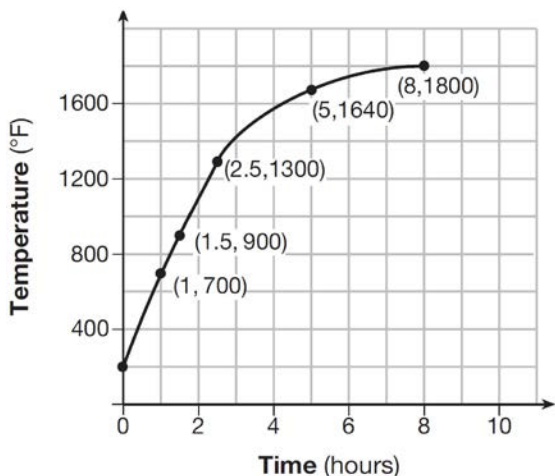


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- 33 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all 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*.
- 34 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.
- 35 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
- 36 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
- 37 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)  $P(x) = -0.5x^2 + 500x + 350$
- 38 Which point is *not* on the graph represented by  $y = x^2 + 3x - 6$ ?
- 1)  $(-6, 12)$
  - 2)  $(-4, -2)$
  - 3)  $(2, 4)$
  - 4)  $(3, -6)$
- 39 If  $a_1 = 6$  and  $a_n = 3 + 2(a_{n-1})^2$ , then  $a_2$  equals
- 1) 75
  - 2) 147
  - 3) 180
  - 4) 900

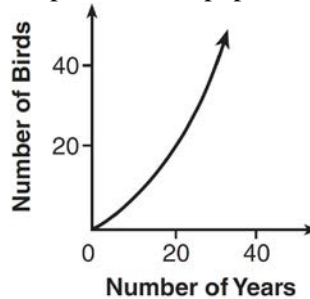
- 40 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200°F.



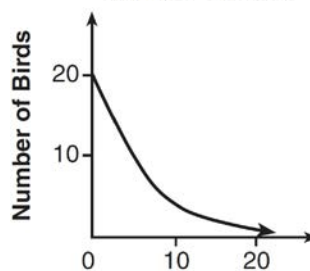
During which time interval did the temperature in the kiln show the greatest average rate of change?

- 1) 0 to 1 hour
  - 2) 1 hour to 1.5 hours
  - 3) 2.5 hours to 5 hours
  - 4) 5 hours to 8 hours
- 41 The expression  $49x^2 - 36$  is equivalent to
- 1)  $(7x - 6)^2$
  - 2)  $(24.5x - 18)^2$
  - 3)  $(7x - 6)(7x + 6)$
  - 4)  $(24.5x - 18)(24.5x + 18)$
- 42 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.

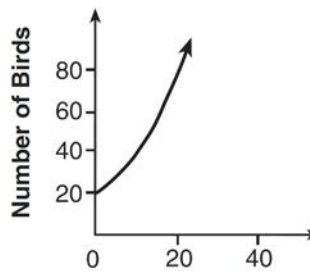
- 43 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?



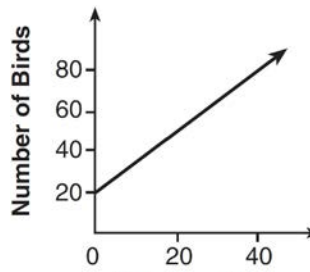
1)



2)



3)

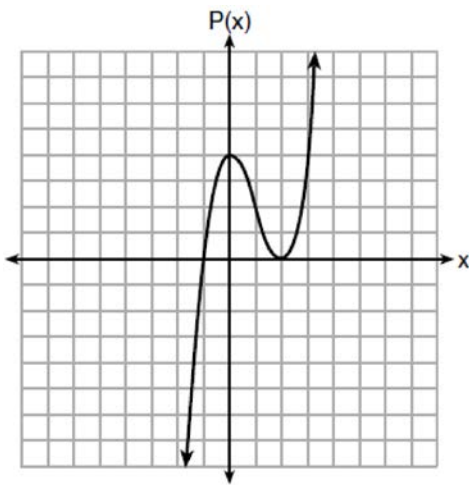


4)

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

- 45 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

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



Which equation could represent  $P(x)$ ?

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

- 48 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

- 49 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

- 50 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)  $A(w) = 4w^2 + 28w$

- 51 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)  $j^2 - 2j = 783$

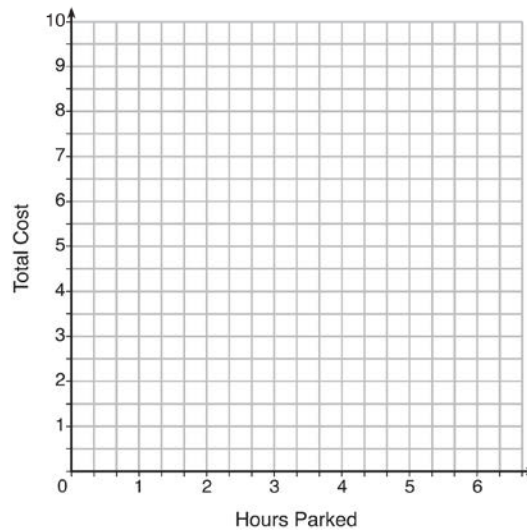
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- 52 The table below lists the total cost for parking for a period of time on a street in Albany, N.Y. The total cost is for any length of time up to and including the hours parked. For example, parking for up to and including 1 hour would cost \$1.25; 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.

- 53 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

<b>Day</b> ( $n$ )	1	2	3	4	5
<b>Height</b> (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent  $h(n)$ , the height of the plant on the  $n$ th day.

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

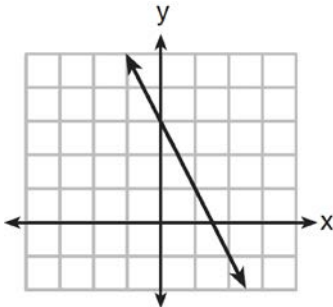
<b>Median Diameter of Grains of Sand, in Millimeters (<math>x</math>)</b>	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
<b>Slope of Beach, in Degrees (<math>y</math>)</b>	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

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.

- 55 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)  $2y = -6x + 10$

- 56 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.

- 57 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  $2$

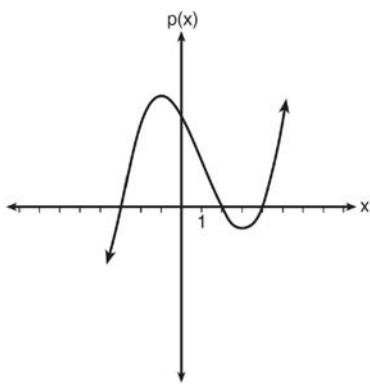
- 58 David has two jobs. He earns \$8 per hour babysitting his neighbor's children and he earns \$11 per hour working at the coffee shop. Write an inequality to represent the number of hours,  $x$ , babysitting and the number of hours,  $y$ , working at the coffee shop that David will need to work to 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.

- 59 Find the zeros of  $f(x) = (x - 3)^2 - 49$ , algebraically.

60 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)  $C = 62 + 30(g - 2)$

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



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

62 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

63 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.

64 Which ordered pair is *not* in the solution set of

$$y > -\frac{1}{2}x + 5 \text{ and } y \leq 3x - 2?$$

- 1) (5,3)
- 2) (4,3)
- 3) (3,4)
- 4) (4,4)

65 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)  $-3 \pm 4\sqrt{14}$

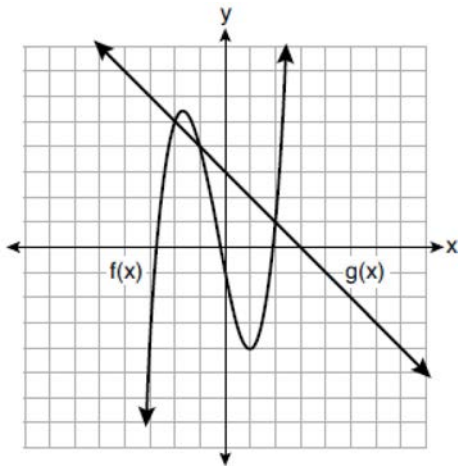
66 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

67 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)  $3x^2 - 14x + 14$

68 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)  $-2$

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

70 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)  $x \geq \frac{54}{5}$

71 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.

72 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)  $40x + 30y = 100$   
 $36x + 30y = -96$

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

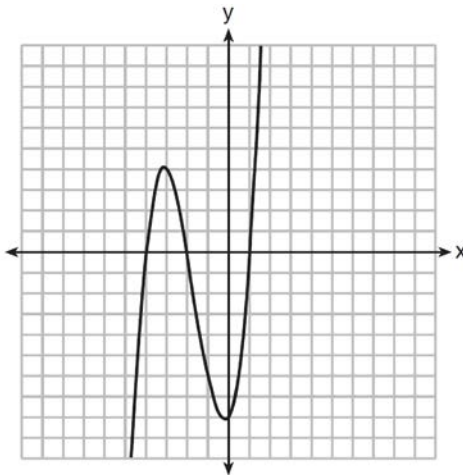
$x$	$r(x)$
-4	-12
-3	-15
-2	-16
-1	-15
0	-12
1	7

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

The function with the *smaller* minimum value is

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

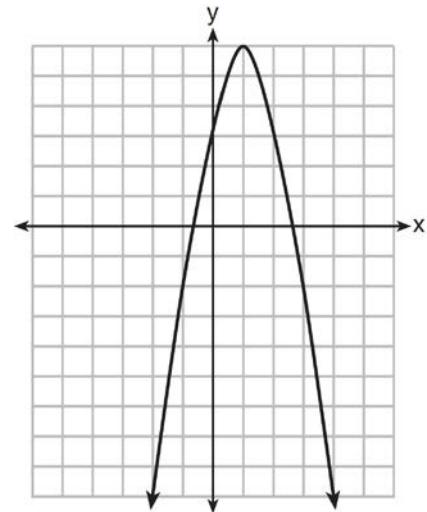
74 The graph of  $f(x)$  is shown below.



Which function could represent the graph of  $f(x)$ ?

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

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



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

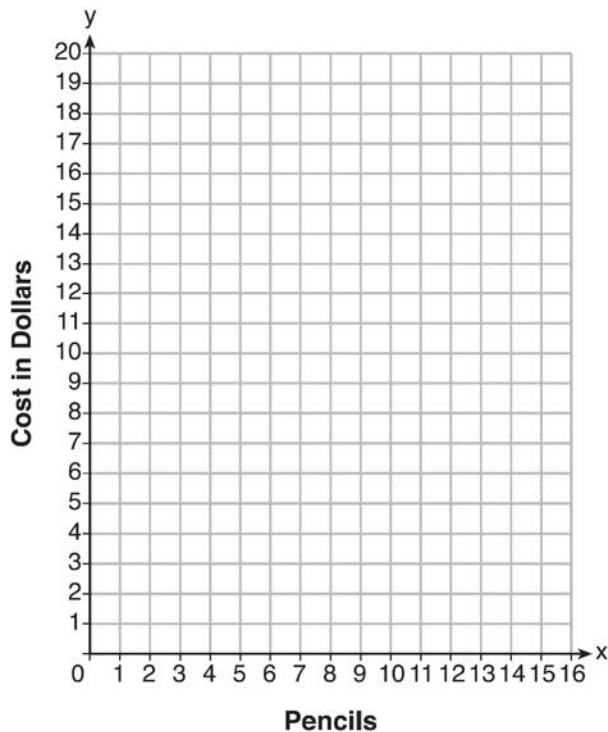
Determine which function has the larger maximum value. Justify your answer.



- 76 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.

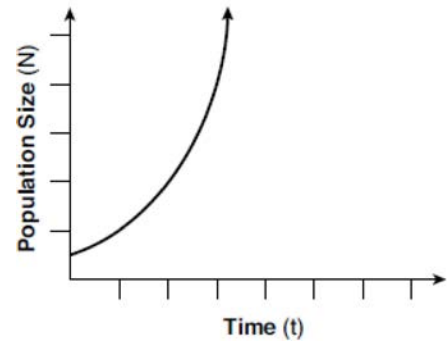


A customer brings 8 pencils to the cashier. The cashier suggests that the total cost to purchase 10 pencils would be less expensive. State whether the cashier is correct or incorrect. Justify your answer.

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

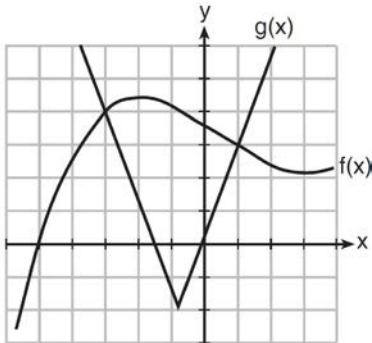
- 78 The expression  $16x^2 - 81$  is equivalent to
- 1)  $(8x - 9)(8x + 9)$
  - 2)  $(8x - 9)(8x - 9)$
  - 3)  $(4x - 9)(4x + 9)$
  - 4)  $(4x - 9)(4x - 9)$

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



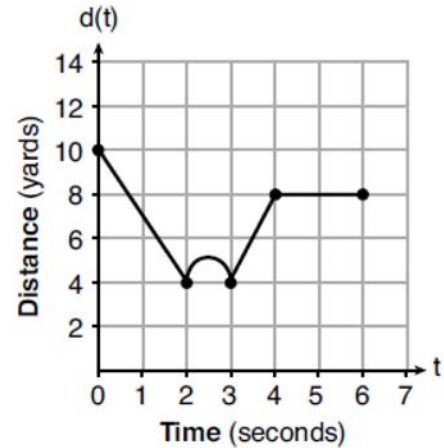
- 1) linear
  - 2) exponential
  - 3) square root
  - 4) absolute value
- 80 Milton has his money invested in a stock portfolio. The value,  $v(x)$ , of his portfolio can be modeled with the function  $v(x) = 30,000(0.78)^x$ , where  $x$  is the number of years since he made his investment. Which statement 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.

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



- 82 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.
- 83 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)  $250 - 5b$

- 84 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)  $4 \leq t \leq 6$
- 85 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.

86 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  $g(x) = 0$ .

87 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.

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

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

88 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

91 A part of Jennifer's work to solve the equation  $2(6x^2 - 3) = 11x^2 - x$  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

89 David correctly factored the expression

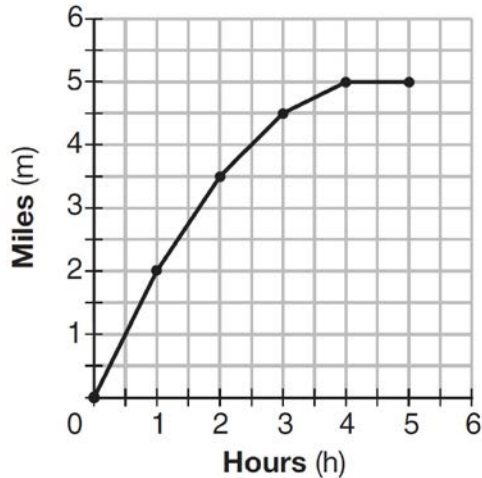
$$m^2 - 12m - 64. \text{ Which expression did he write?}$$

- 1)  $(m - 8)(m - 8)$
- 2)  $(m - 8)(m + 8)$
- 3)  $(m - 16)(m + 4)$
- 4)  $(m + 16)(m - 4)$

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

- 1)  $f(3) = -2$
- 2)  $f(-2) = 3$
- 3)  $f(-2) = -15$
- 4)  $f(-15) = -2$

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



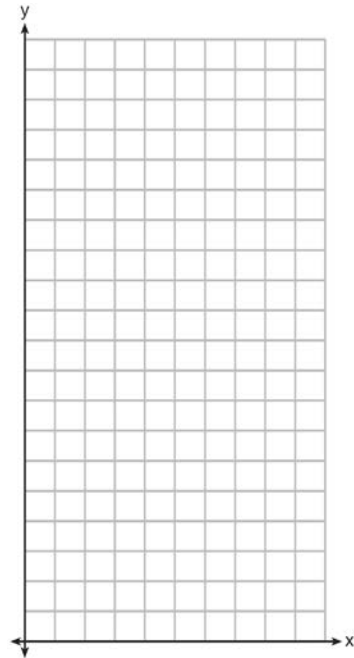
Which hourly interval had the greatest rate of change?

- 1) hour 0 to hour 1
  - 2) hour 1 to hour 2
  - 3) hour 2 to hour 3
  - 4) hour 3 to hour 4
- 94 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)  $23(x + 250)$
- 95 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.

- 96 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

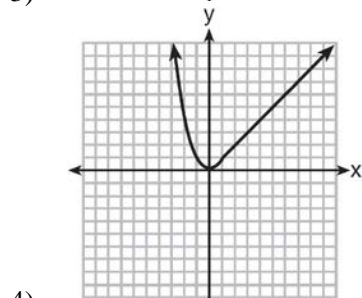
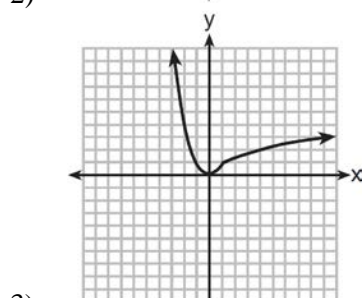
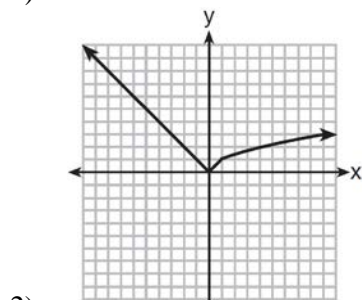
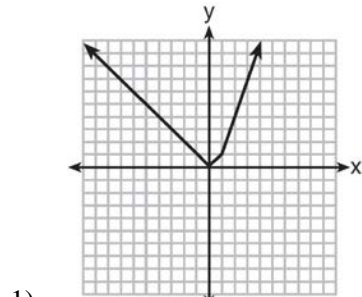
- 97 Kendal bought  $x$  boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes,  $x$ , Kendal bought?
- 1)  $2x - 12 = 60$
  - 2)  $12x - 2 = 60$
  - 3)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

- 98 Graph  $f(x) = x^2$  and  $g(x) = 2^x$  for  $x \geq 0$  on the set of axes below.



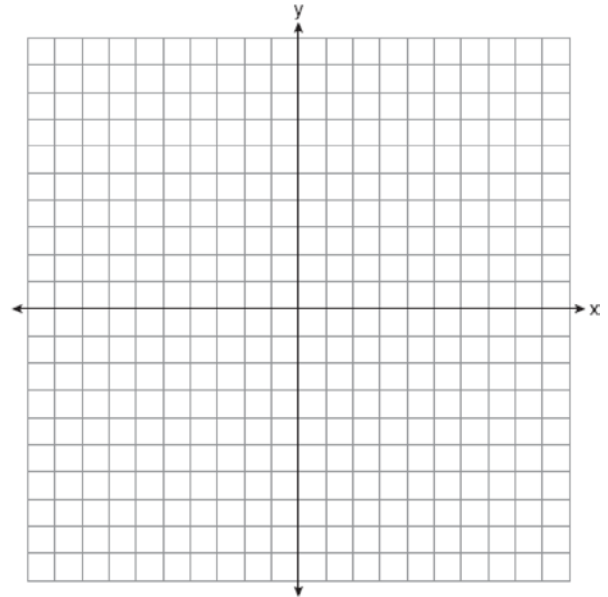
State which function,  $f(x)$  or  $g(x)$ , has a greater value when  $x = 20$ . Justify your reasoning.

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



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

101 On the set of axes below, graph the function represented by  $y = \sqrt[3]{x-2}$  for the domain  $-6 \leq x \leq 10$ .



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

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

103 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.

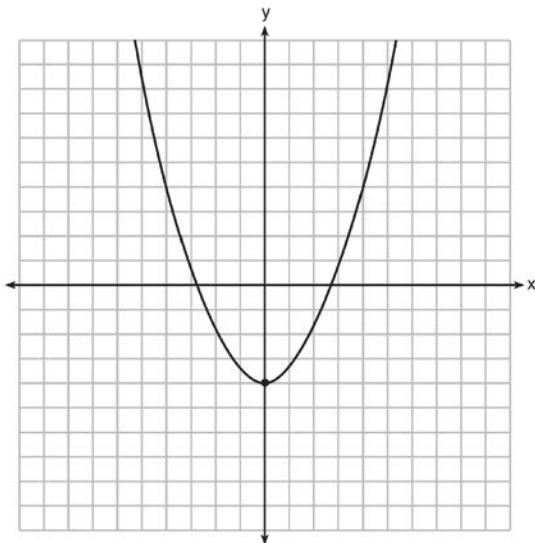
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- 104 Let  $f$  be a function such that  $f(x) = 2x - 4$  is defined on the domain  $2 \leq x \leq 6$ . The range of this function is
- 1)  $0 \leq y \leq 8$
  - 2)  $0 \leq y < \infty$
  - 3)  $2 \leq y \leq 6$
  - 4)  $-\infty < y < \infty$

- 105 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

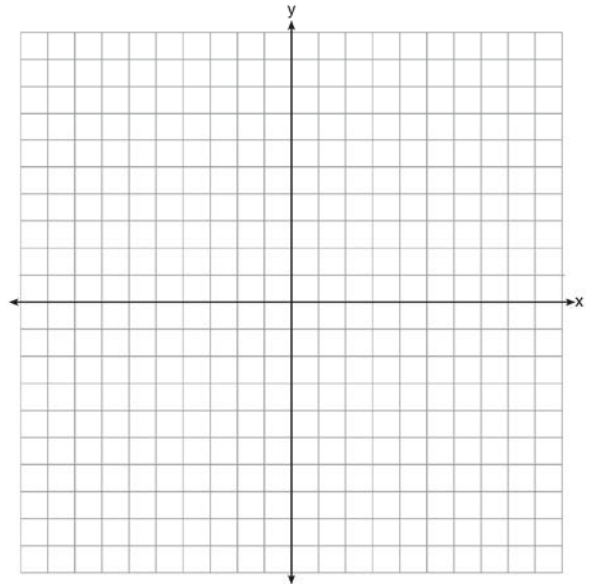
- 106 Ryker is given the graph of the function  $y = \frac{1}{2}x^2 - 4$ . He wants to find the zeros of the function, but is unable to read them exactly from the graph.



Find the zeros in simplest radical form.

- 107 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.

- 108 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  $h(x)$ ?

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



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115 Solve the following equation by completing the square:  $x^2 + 4x = 2$

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

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

117 Write the first five terms of the recursive sequence defined below.

$$a_1 = 0$$

$$a_n = 2(a_{n-1})^2 - 1, \text{ for } n > 1$$

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

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

120 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

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

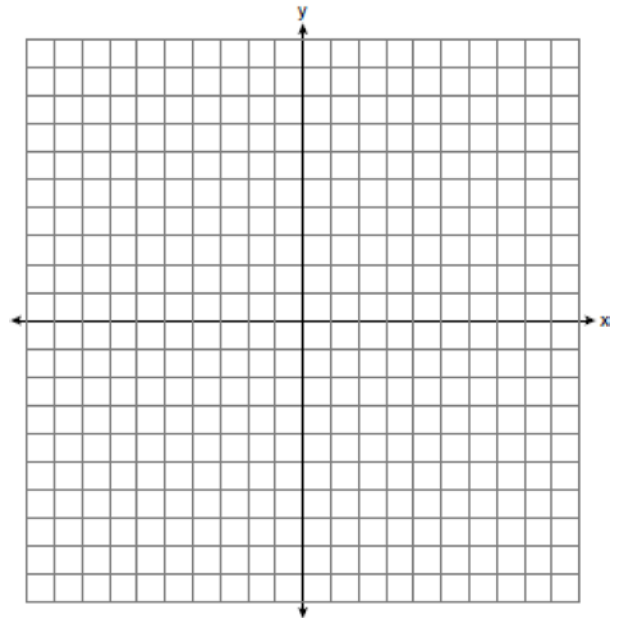
122 Next weekend Marnie wants to attend either carnival A or carnival B. Carnival A charges \$6 for admission and an additional \$1.50 per ride.

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.





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

- 124 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.]

- 126 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.

- 125 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.

- 127 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)  $3x + 3y = 9$   
 $2x - 3y = -1$

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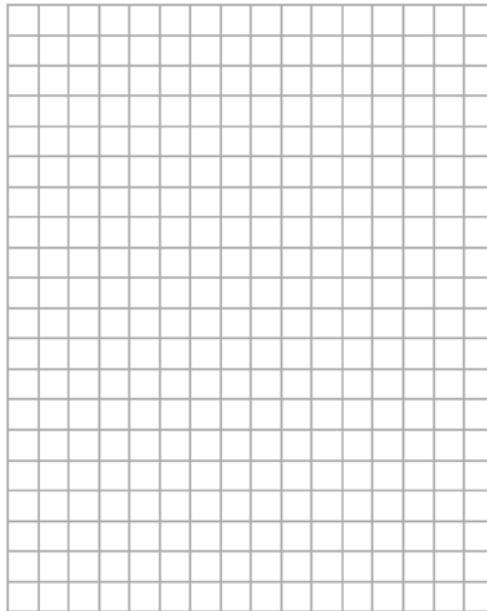
128 The heights, in feet, of former New York Knicks basketball players are listed below.

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.

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

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

- 131 About a year ago, Joey watched an online video of a band and noticed that it had been viewed only 843 times. One month later, Joey noticed that the band's video had 1708 views. Joey made the table below to keep track of the cumulative number of views the video was getting online.

Months Since First Viewing	Total Views
0	843
1	1708
2	forgot to record
3	7124
4	14,684
5	29,787
6	62,381

- a) Write a regression equation that best models these data. Round all values to the *nearest hundredth*. Justify your choice of regression equation. b) As shown in the table, Joey forgot to record the number of views after the second month. Use the equation from part a to estimate the number of full views of the online video that Joey forgot to record.
- 132 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)  $9.00 + 3x = 20.00$                       3)  $2x + 3.50 = 14.50$   
 2)  $9.00 + 3.50x = 20.00$                     4)  $2x + 9.00 = 14.50$
- 133 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)  $y = x^2 - 10x + 24$
- 134 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)  $4$

- 135 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)  $x + 2y = 5$

$$4x + 2y = 12$$

- 136 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.

- 137 Which recursively defined function has a first term equal to 10 and a common difference of 4?

1)  $f(1) = 10$

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

2)  $f(1) = 4$

$$f(x) = f(x - 1) + 10$$

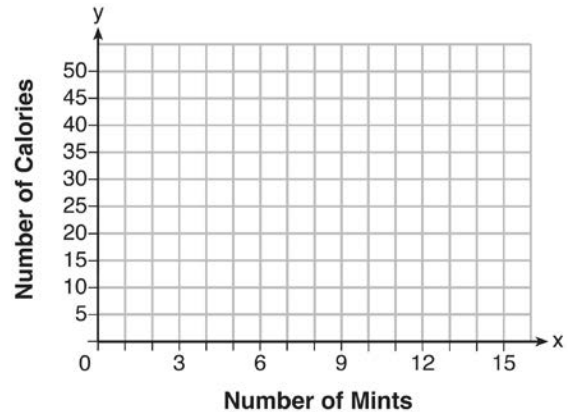
3)  $f(1) = 10$

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

4)  $f(1) = 4$

$$f(x) = 10f(x - 1)$$

- 138 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.

- 139 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

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

1) 1

2) -2

3) -1

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

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

141 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)  $3.00a + 1.50s$

142 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

143 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

144 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,  $t$ .

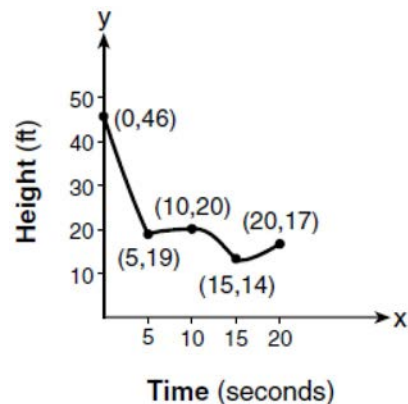
145 What is the product of  $2x + 3$  and  $4x^2 - 5x + 6$ ?

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

146 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.

147 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

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

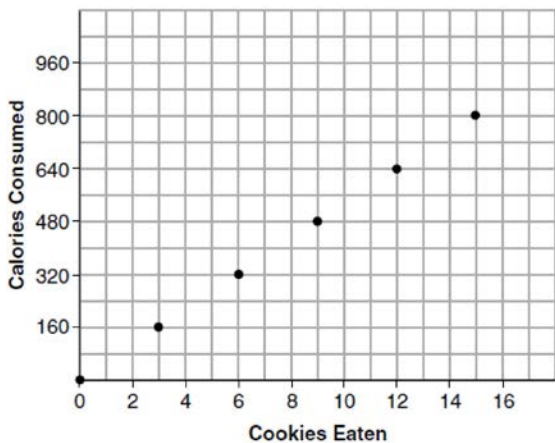
148 If a population of 100 cells triples every hour, which function represents  $p(t)$ , the population after  $t$  hours?

- 1)  $p(t) = 3(100)^t$
- 2)  $p(t) = 100(3)^t$
- 3)  $p(t) = 3t + 100$
- 4)  $p(t) = 100t + 3$

149 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  $f(x)$

150 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.



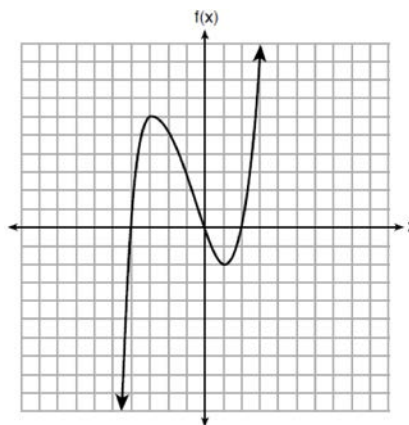
Explain why it is appropriate for Samantha to draw a line through the points on the graph.

151 Solve the inequality below to determine and state the smallest possible value for  $x$  in the solution set.

$$3(x + 3) \leq 5x - 3$$

152 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.

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



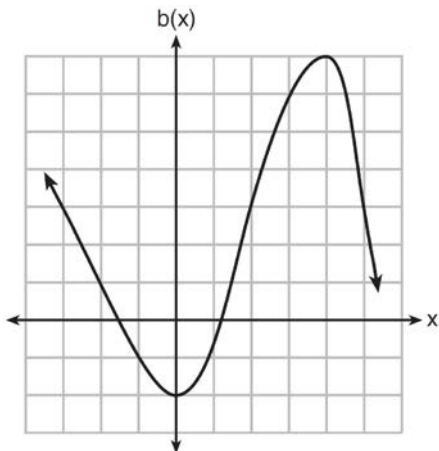
What is the value of  $f(-3)$ ?

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

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

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

- 155 Richard is asked to transform the graph of  $b(x)$  below.

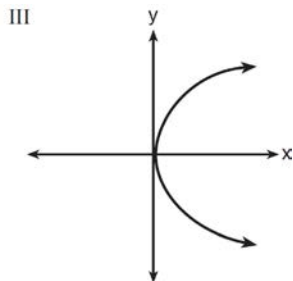


The graph of  $b(x)$  is transformed using the equation  $h(x) = b(x - 2) - 3$ . Describe how the graph of  $b(x)$  changed to form the graph of  $h(x)$ .

- 156 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

- 157 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)  $1.25r + 2g < 50$   
 $r \leq 10$   
 $g \geq 12$

- 158 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)  $5x^2 - 12x - 2$

- 159 Which interval represents the range of the function

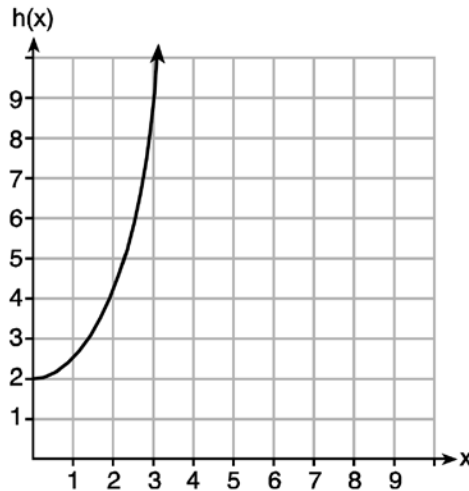
$$h(x) = 2x^2 - 2x - 4?$$

- 1)  $(0.5, \infty)$
- 2)  $(-4.5, \infty)$
- 3)  $[0.5, \infty)$
- 4)  $[-4.5, \infty)$

160 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)  $h(x)$ ,  $f(x)$ ,  $g(x)$

161 The value of  $x$  that satisfies the equation

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

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

163 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

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



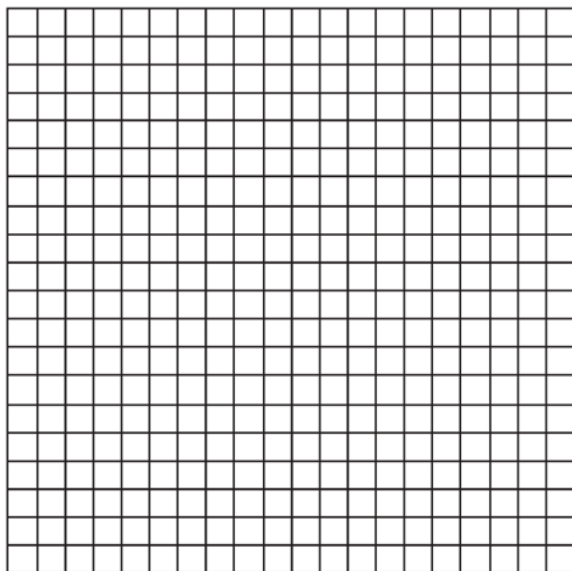
164 Which expression is equivalent to  $x^4 - 12x^2 + 36$ ?

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

165 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.

166 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.

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

x	f(x)
0	6
2	10
4	14
6	18

1)

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

2)

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

3)

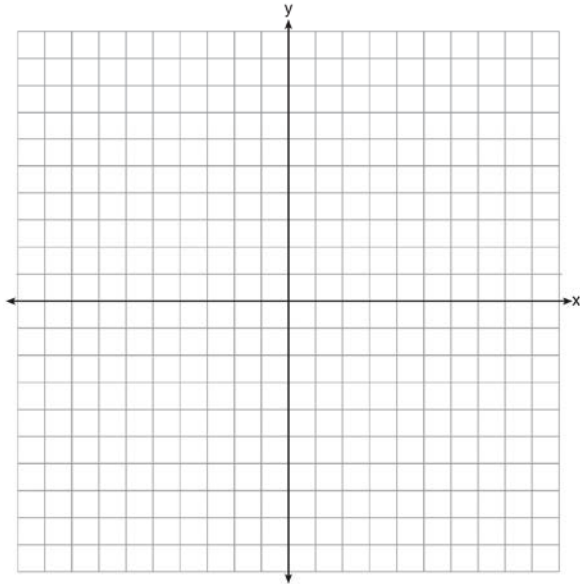
x	f(x)
0	6
2	2
4	-2
6	-6

4)

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

169 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.

- 170 Let  $f(x) = -2x^2$  and  $g(x) = 2x - 4$ . On the set of axes below, draw the graphs of  $y = f(x)$  and  $y = g(x)$ .

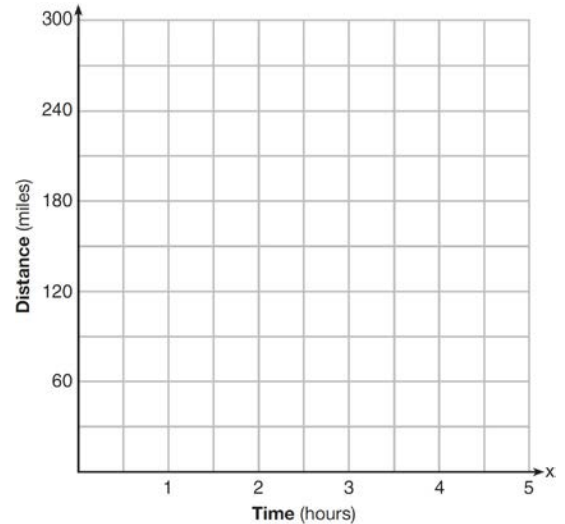


Using this graph, determine and state *all* values of  $x$  for which  $f(x) = g(x)$ .

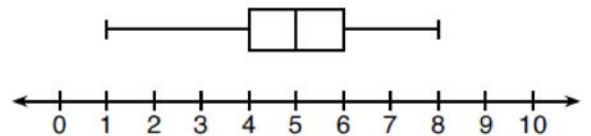
- 171 The population of a city can be modeled by  $P(t) = 3810(1.0005)^{7t}$ , where  $P(t)$  is the population after  $t$  years. Which function is approximately equivalent to  $P(t)$ ?
- 1)  $P(t) = 3810(0.1427)^t$
  - 2)  $P(t) = 3810(1.0035)^t$
  - 3)  $P(t) = 26,670(0.1427)^t$
  - 4)  $P(t) = 26,670(1.0035)^t$

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

- 173 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.

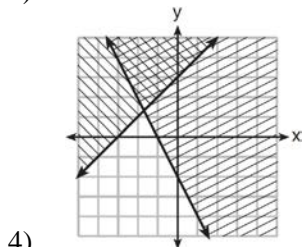
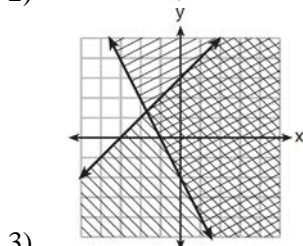
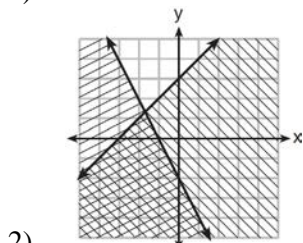
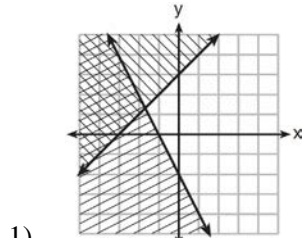


- 174 What is the range of the box plot shown below?



- 1) 7
  - 2) 2
  - 3) 3
  - 4) 4
- 175 Solve  $6x^2 - 42 = 0$  for the exact values of  $x$ .

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

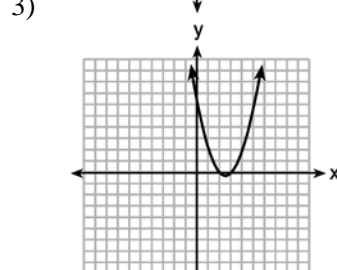
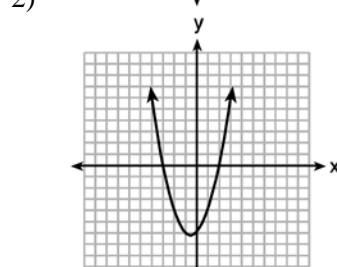
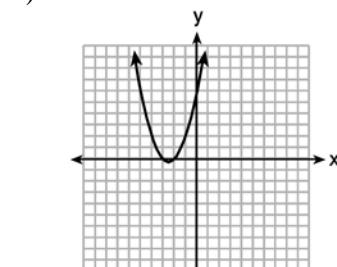
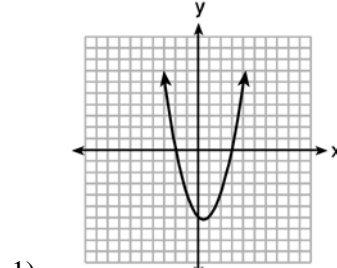


177 When the function  $g(x) = \begin{cases} 5x, & x \leq 3 \\ x^2 + 4, & x > 3 \end{cases}$  is graphed

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  $(3, 13)$

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



179 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.

180 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?

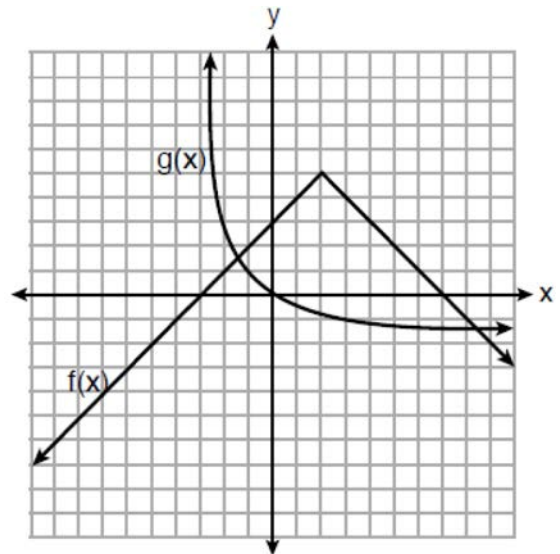
- 1) 2.4
- 2) 0.04
- 3) -2.4
- 4) -0.04

181 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.

182 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)  $0.75(7) + 1.25b \leq 22$

183 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

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

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

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

- |  |   |
|--|---|
| <p>1) The rocket was launched from a height of 180 feet.</p> <p>2) The maximum height of the rocket occurred 3 seconds after launch.</p> | <p>3) The rocket was in the air approximately 6 seconds before hitting the ground.</p> <p>4) The rocket was above 300 feet for approximately 2 seconds.</p> |
|--|---|

185 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

186 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)  $6x^3 + 2x^2 - 17$

187 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)  $-5y = -5$   
 $x - 4y = -10$

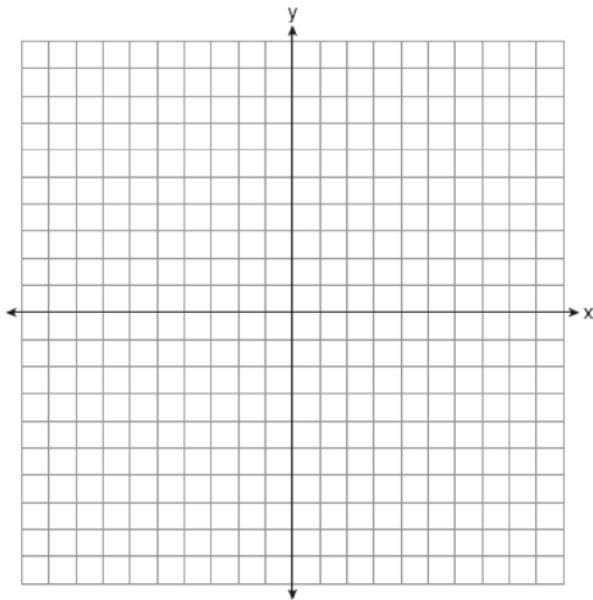
188 For which value of  $P$  and  $W$  is  $P + W$  a rational number?

- 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  $W = \frac{1}{\sqrt{2}}$

189 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.

190 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

191 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.

192 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)  $2(9x + 25)(9x - 25)$

193 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.

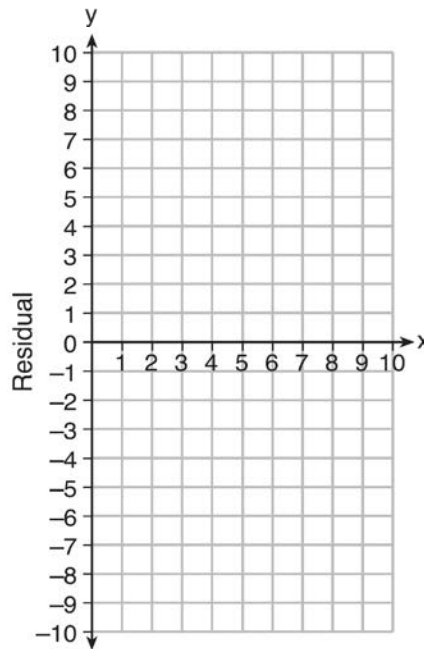
- 1) I, only
- 2) II, only
- 3) I and II
- 4) I and III

- 194 Use the data below to write the regression equation ( $y = ax + b$ ) for the raw test score based on the hours tutored. Round all values to the *nearest hundredth*.

<b>Tutor Hours, <math>x</math></b>	<b>Raw Test Score</b>	<b>Residual (Actual-Predicted)</b>
1	30	1.3
2	37	1.9
3	35	-6.4
4	47	-0.7
5	56	2.0
6	67	6.6
7	62	-4.7

Equation: \_\_\_\_\_

Create a residual plot on the axes below, using the residual scores in the table above.



Based on the residual plot, state whether the equation is a good fit for the data. Justify your answer.

- 195 Solve the equation below for  $x$  in terms of  $a$ .  
 $4(ax + 3) - 3ax = 25 + 3a$

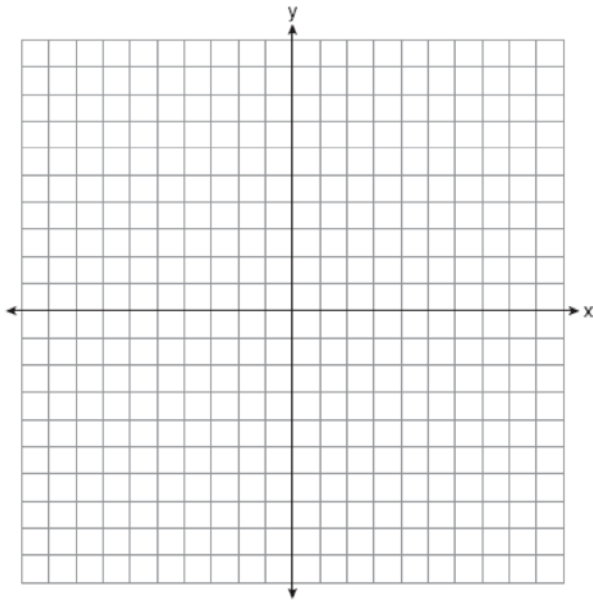
196 The solution of the equation  $(x + 3)^2 = 7$  is

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

197 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  $2$

198 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  $k$ .

199 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.

200 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)  $(5, 5)$

201 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)  $-12$

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



203 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)

204 In the equation  $x^2 + 10x + 24 = (x + a)(x + b)$ ,  $b$  is an integer. Find algebraically *all* possible values of  $b$ .

205 For the sequence  $-27, -12, 3, 18, \dots$ , the expression that defines the  $n$ th term where  $a_1 = -27$  is

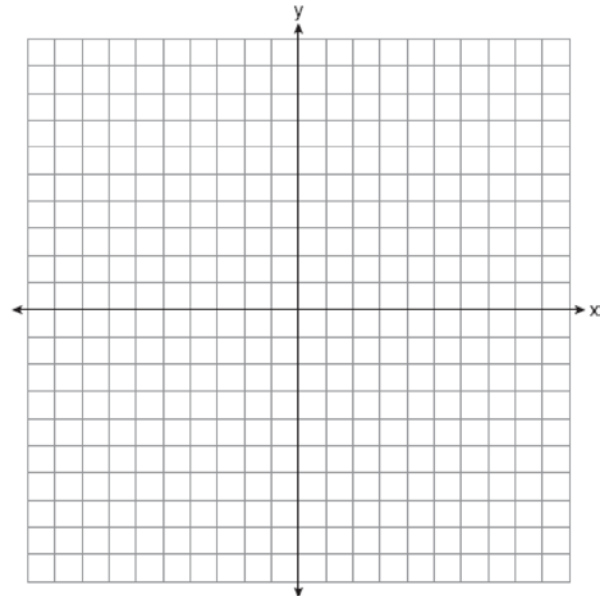
- 1)  $15 - 27n$
- 2)  $15 - 27(n - 1)$
- 3)  $-27 + 15n$
- 4)  $-27 + 15(n - 1)$

206 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  $K$ .

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



- 208 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?

- |   |   |
|---|---|
| <p>1) The median salaries in both companies are greater than \$37,000.</p> <p>2) The mean salary in company 1 is greater than the mean salary in company 2.</p> | <p>3) The salary range in company 2 is greater than the salary range in company 1.</p> <p>4) The mean age of workers at company 1 is greater than the mean age of workers at company 2.</p> |
|---|---|

- 209 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

- 210 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.

- 211 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.

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

212 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  $0$

213 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)  $2(x + 3)(x + 2)$

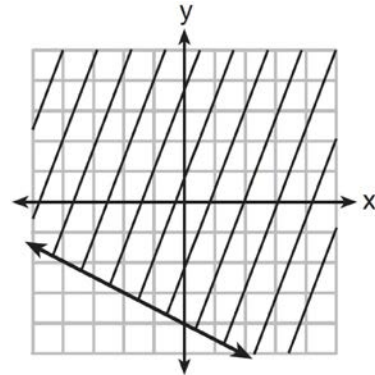
214 Lizzy has 30 coins that total \$4.80. All of her coins are dimes,  $D$ , and quarters,  $Q$ . Which system of equations models this situation?

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

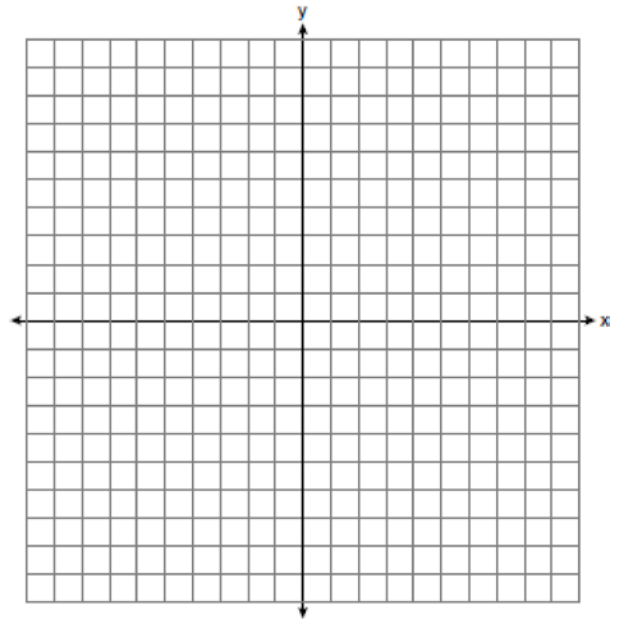
215 Given the graph of the line represented by the equation  $f(x) = -2x + b$ , if  $b$  is increased by 4 units, the graph of the new line would be shifted 4 units

- 1) right
- 2) up
- 3) left
- 4) down

216 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.



Algebra I Regents Exam Questions at Random

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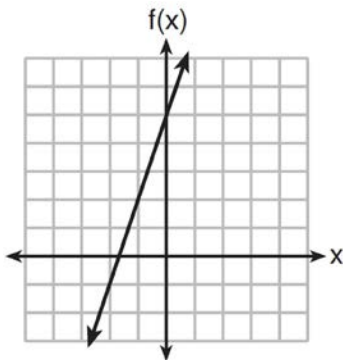
- 217 Which situation does *not* describe a causal relationship?
- 1) The higher the volume on a radio, the louder the sound will be.
  - 2) The faster a student types a research paper, the more pages the paper will have.
  - 3) The shorter the distance driven, the less gasoline that will be used.
 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

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

- 1) 6
- 2) 7
- 3) 8
- 4) 9

219 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  $(1, -4)$

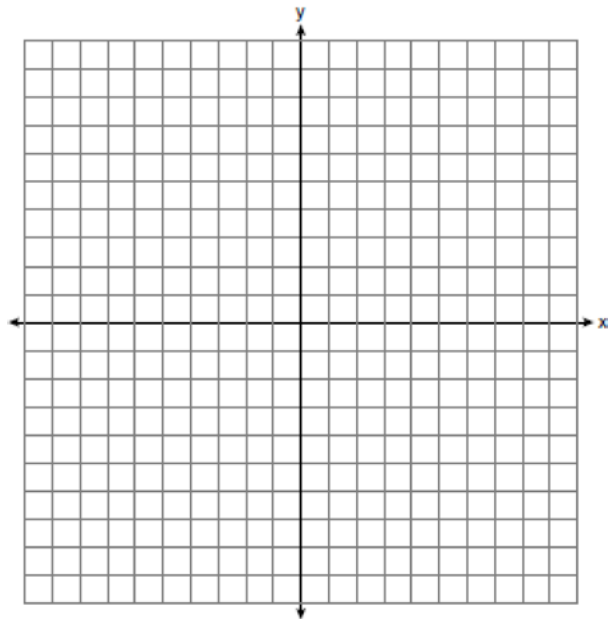


4)

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

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

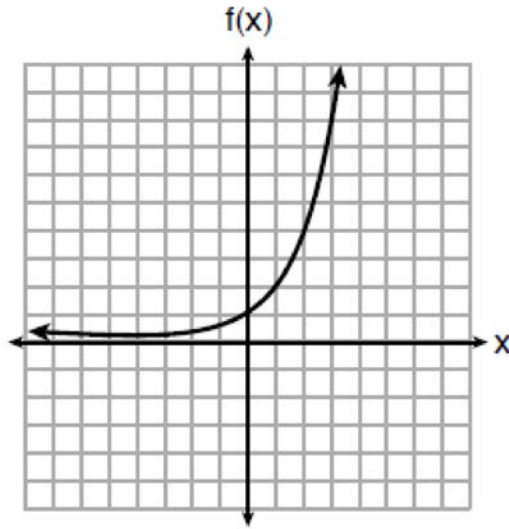
$$y + 2x > -5$$



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.

221 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.

222 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?

- |   |   |
|---|---|
| <p>1) The y-intercept for <math>h(x)</math> is greater than the y-intercept for <math>f(x)</math>.</p> <p>2) The y-intercept for <math>f(x)</math> is greater than the y-intercept for <math>g(x)</math>.</p> | <p>3) The y-intercept for <math>h(x)</math> is greater than the y-intercept for both <math>g(x)</math> and <math>f(x)</math>.</p> <p>4) The y-intercept for <math>g(x)</math> is greater than the y-intercept for both <math>f(x)</math> and <math>h(x)</math>.</p> |
|---|---|

223 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?

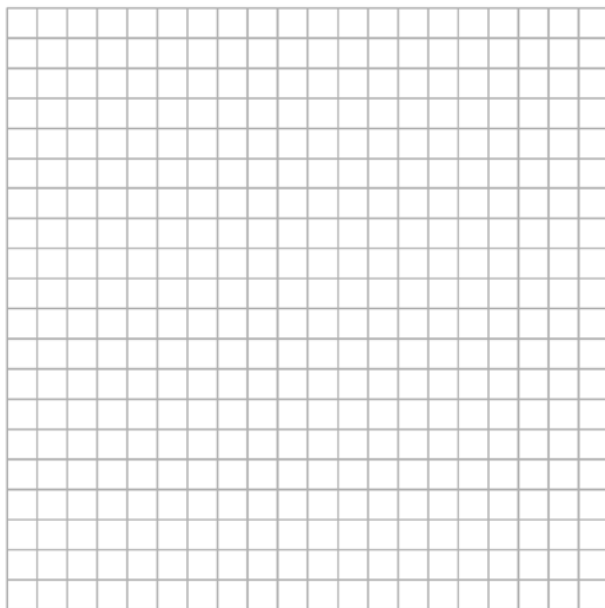
- |                         |                           |
|-------------------------|---------------------------|
| <p>1) 6</p> <p>2) 8</p> | <p>3) 10</p> <p>4) 12</p> |
|-------------------------|---------------------------|

224 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.

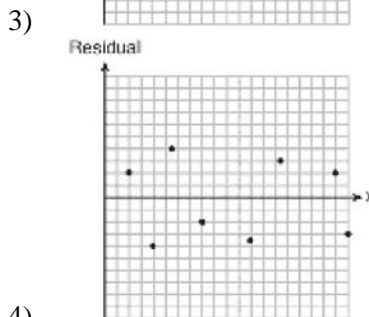
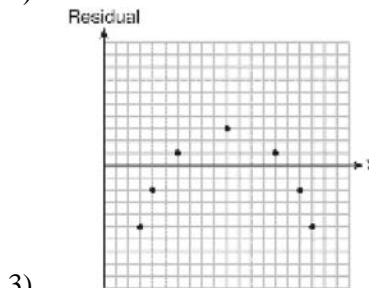
225 During a snowstorm, a meteorologist tracks the amount of accumulating snow. For the first three hours of the storm, the snow fell at a constant rate of one inch per hour. The storm then stopped for two hours and then started again at a constant rate of one-half inch per hour for the next four hours.  
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?

226 Which statistic would indicate that a linear function would *not* be a good fit to model a data set?

- 1)  $r = -0.93$
- 2)  $r = 1$



227 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.

Algebra I Regents Exam Questions at Random

www.jmap.org

- 228 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

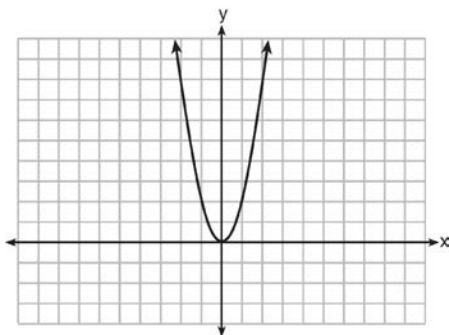
Number of Hours, $x$	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

- 229 An outdoor club conducted a survey of its members. The members were asked to state their preference between skiing and snowboarding. Each member had to pick one. Of the 60 males, 45 stated they preferred to snowboard. Twenty-two of the 60 females preferred to ski. What is the relative frequency that a male prefers to ski?

- 1) 0.125
- 2) 0.25
- 3) 0.333
- 4) 0.405

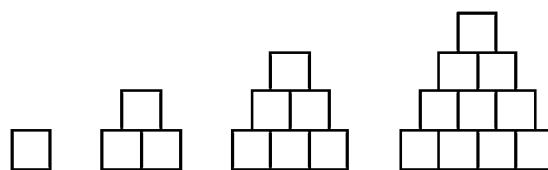
- 230 The graph of the equation  $y = ax^2$  is shown below.



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

- 231 A sequence of blocks is shown in the diagram below.



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

- 1) 13
- 2) 21
- 3) 28
- 4) 36

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

$$5x + y = 13$$

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

$$y = -5x + 13$$

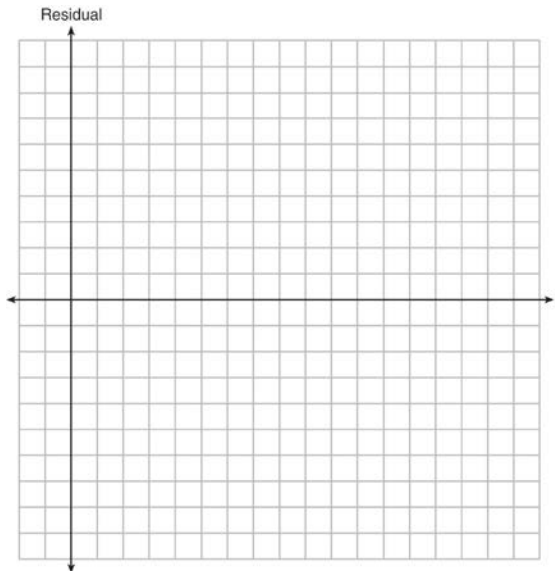
$$y - 7 = 5(x - 4)$$

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

233 The table below represents the residuals for a line of best fit.

<b><math>x</math></b>	2	3	3	4	6	7	8	9	9	10
<b>Residual</b>	2	1	-1	-2	-3	-2	-1	2	0	3

Plot these residuals on the set of axes below.



Using the plot, assess the fit of the line for these residuals and justify your answer.

234 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</b> (city blocks) ( $x$ )	0	0	1	1	3	4	7	11	14	19
<b>Cost of a Room</b> (dollars) ( $y$ )	293	263	244	224	185	170	219	153	136	111

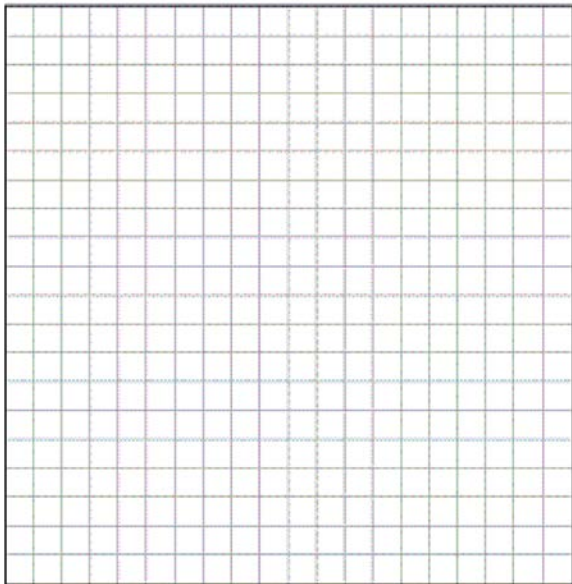
Write the linear regression equation for this data set. Round all values to the *nearest hundredth*. State the correlation coefficient for this data set, to the *nearest hundredth*. Explain what the sign of the correlation coefficient suggests in the context of the problem.



Algebra I Regents Exam Questions at Random

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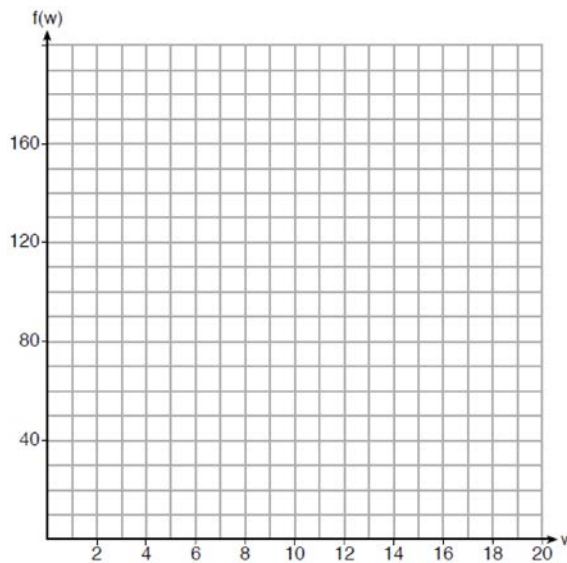
235 Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda. Write an equation that can determine 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.

236 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.

237 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.

238 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?

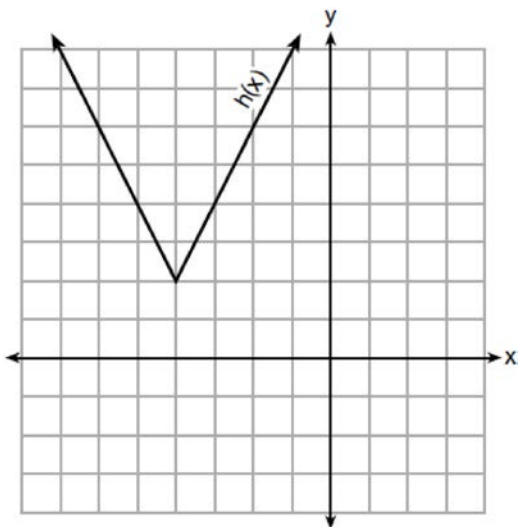
- 1)  $-13$
- 2)  $13$
- 3)  $-26$
- 4)  $26$



244 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)  $\{0, 1, 2, 3, \dots\}$

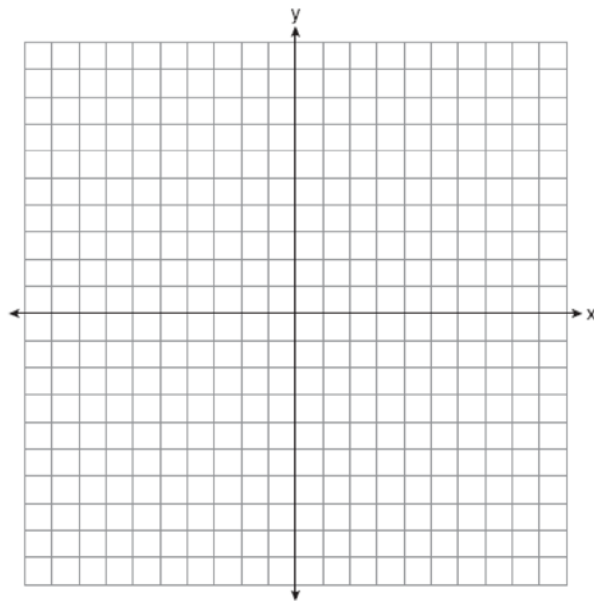
245 The function  $h(x)$ , which is graphed below, and the function  $g(x) = 2|x + 4| - 3$  are given.



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

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



247 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

248 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)  $3000(1 - 0.02)^{18}$

### Algebra I Regents at Random

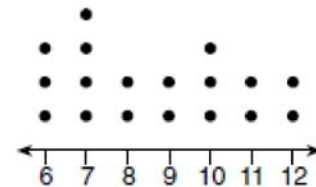
- 249 The range of the function  $f(x) = |x + 3| - 5$  is
- 1)  $[-5, \infty)$
  - 2)  $(-5, \infty)$
  - 3)  $[3, \infty)$
  - 4)  $(3, \infty)$

- 250 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)  $20^\circ$  Celsius
  - 2)  $20^\circ$  Fahrenheit
  - 3)  $154^\circ$  Celsius
  - 4)  $154^\circ$  Fahrenheit

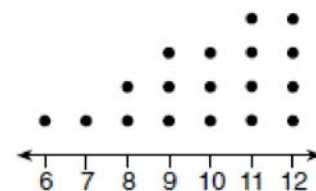
- 251 What type of relationship exists between the number of pages printed on a printer and the amount of ink used by that printer?
- 1) positive correlation, but not causal
  - 2) positive correlation, and causal
  - 3) negative correlation, but not causal
  - 4) negative correlation, and causal

- 252 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)  $c(z) = 0.20(z - 1) + 0.46$

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



Soccer Players' Ages



Basketball Players' Ages

Which statement about the given data sets is correct?

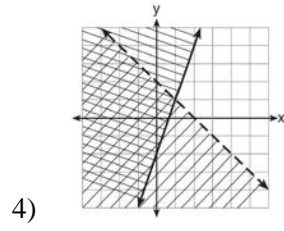
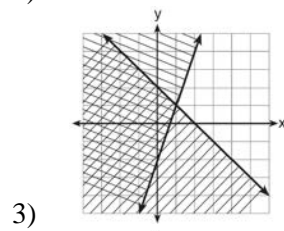
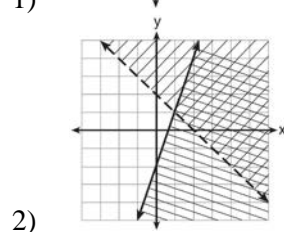
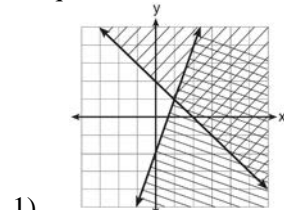
- 1) The data for soccer players are skewed right.
  - 2) The data for soccer players have less spread than the data for basketball players.
  - 3) The data for basketball players have the same median as the data for soccer players.
  - 4) The data for basketball players have a greater mean than the data for soccer players.
- 254 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)  $(x - 8)^2 = 23$

- 255 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)  $(4x + 6)(4x + 6)$

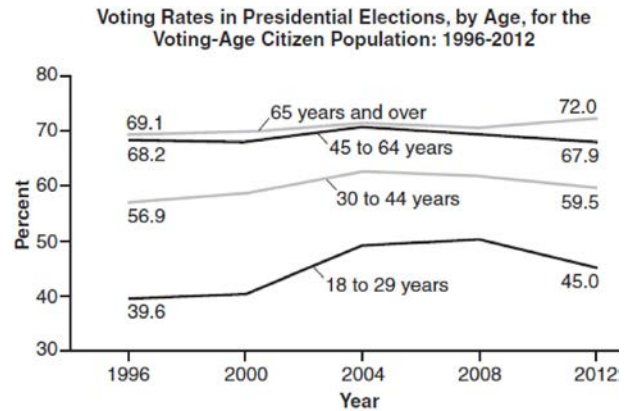
- 256 Given:  $y + x > 2$

$$y \leq 3x - 2$$

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



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



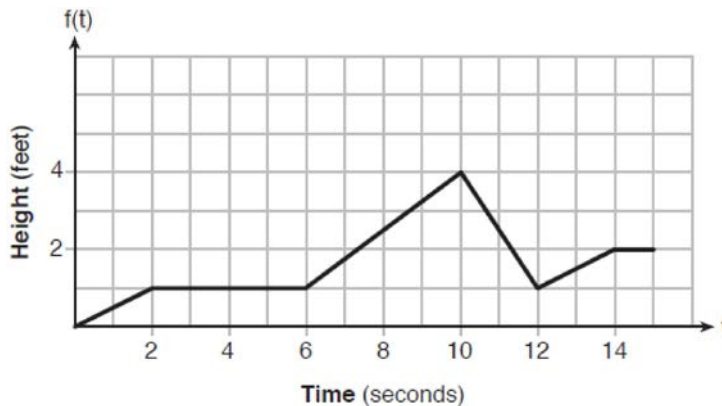
Which statement does *not* correctly interpret voting rates by age based on the given graph?

- 1) For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.
- 2) From 1996-2012, the average rate of change was positive for only two age groups.
- 3) About 70% of people 45 and older voted in the 2004 election.
- 4) The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.

- 258 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)  $\frac{Pt}{I}$

- 259 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.

- 260 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.

- 261 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.
- 262 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.
- 263 Solve the quadratic equation below for the exact values of  $x$ .

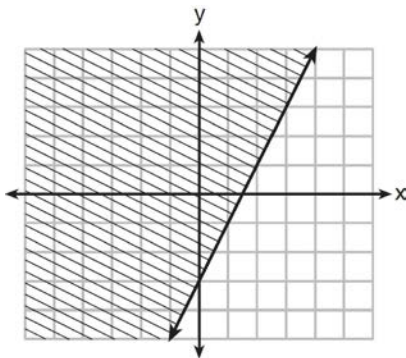
$$4x^2 - 5 = 75$$

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- 264 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)  $(3x - 4)(x + 2)$

- 265 Which inequality is represented by the graph below?



- 1)  $y \leq 2x - 3$
  - 2)  $y \geq 2x - 3$
  - 3)  $y \leq -3x + 2$
  - 4)  $y \geq -3x + 2$
- 266 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

- 267 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)  $-6$

- 268 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.

- 269 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)

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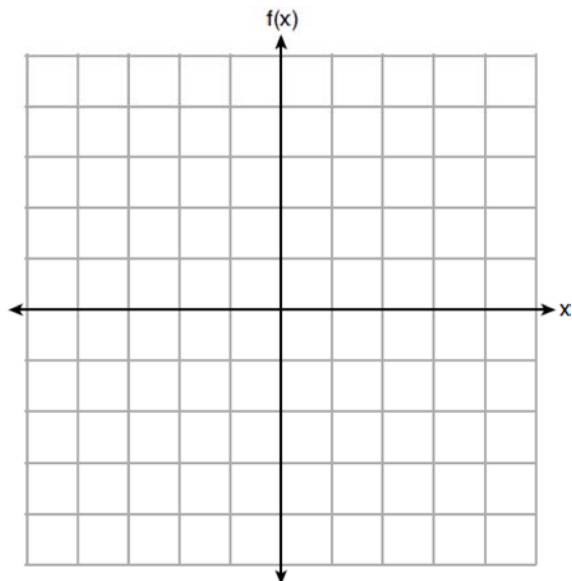
270 A radio station did a survey to determine what kind of music to play by taking a sample of middle school, high school, and college students. They were asked which of three different types of music they prefer on the radio: hip-hop, alternative, or classic rock. The results are summarized in the table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

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

What percentage of college students prefer classic rock?

- 1) 14%
- 2) 28%
- 3) 33%
- 4) 58%

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



273 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)  $r = \frac{V}{2\pi}$

274 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  $-a$

272 Given the set  $\{x | -2 \leq x \leq 2, \text{ where } x \text{ is an integer}\}$ , what is the solution of  $-2(x - 5) < 10$ ?

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

275 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  $-1$



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- 276 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
- 277 Marc bought a new laptop for \$1250. He kept track of the value of the laptop over the next three years, as shown in the table below.

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

Which function can be used to determine the value of the laptop for  $x$  years after the purchase?

- 1)  $f(x) = 1000(1.2)^x$   
 2)  $f(x) = 1000(0.8)^x$   
 3)  $f(x) = 1250(1.2)^x$   
 4)  $f(x) = 1250(0.8)^x$
- 278 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)  $(-3, 2)$
- 279 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)  $-\frac{5}{6}$

- 280 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.
- 281 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.

- 282 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.

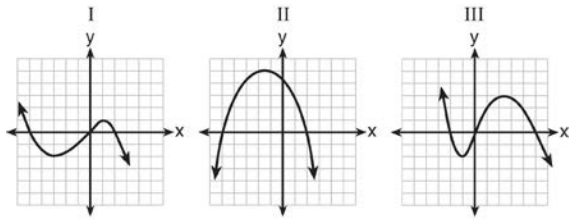
<b>Time (hrs)</b>	0	2	5	7
<b>Distance (mi)</b>	0	140	375	480

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

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- 283 A polynomial function contains the factors  $x$ ,  $x - 2$ , and  $x + 5$ . Which graph(s) below could represent the graph of this function?



- 1) I, only
  - 2) II, only
  - 3) I and III
  - 4) I, II, and III
- 284 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.

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

- 286 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.

- 287 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)  $0 \leq t \leq 14$

- 288 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)  $-4 \pm \sqrt{24}$

- 289 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.

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- 290 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.

$$4(2a + 3) = -3(a - 1) + 31 - 11a \quad \text{Given}$$

$$8a + 12 = -3a + 3 + 31 - 11a$$

$$8a + 12 = 34 - 11a$$

$$22a + 12 = 34$$

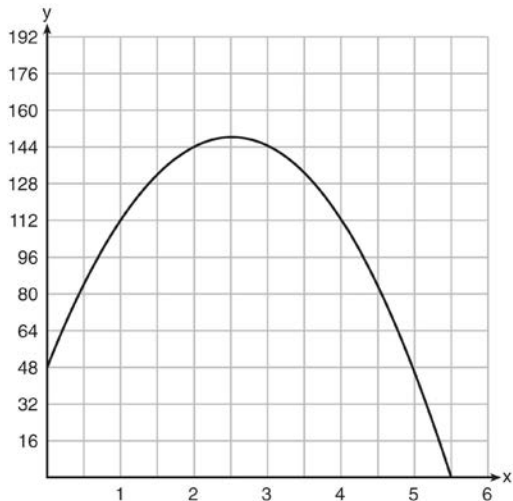
Combining like terms

- 291 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.
- 292 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)  $A(t) = 5000(1.013)^t (1.013)^{25}$
- 293 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)  $(2, 9)$
- 294 Solve  $x^2 - 8x - 9 = 0$  algebraically. Explain the first step you used to solve the given equation.
- 295 Which value of  $x$  makes  $\frac{x-3}{4} + \frac{2}{3} = \frac{17}{12}$  true?
- 1) 8
  - 2) 6
  - 3) 0
  - 4) 4
- 296 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
- 297 The range of the function defined as  $y = 5^x$  is
- 1)  $y < 0$
  - 2)  $y > 0$
  - 3)  $y \leq 0$
  - 4)  $y \geq 0$

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- 298 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)  $x \geq 2$

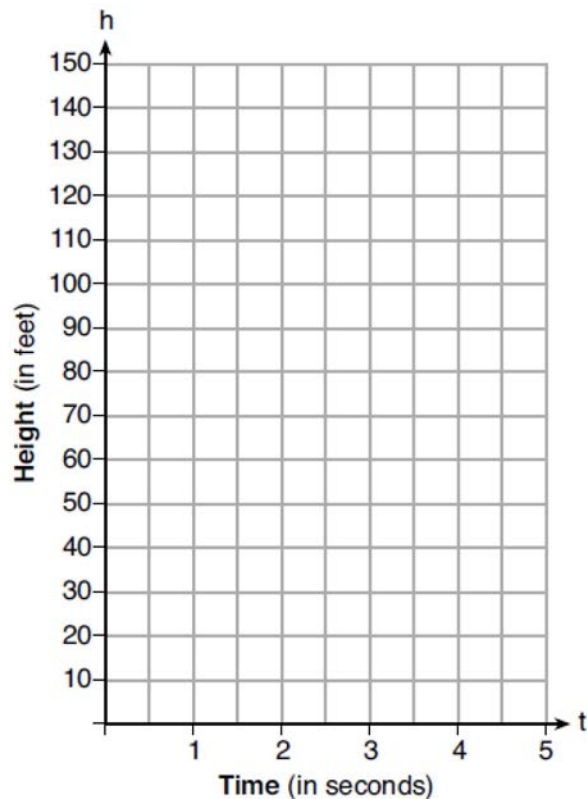
- 299 Which system of equations has the same solutions as the system below?

$$3x - y = 7$$

$$2x + 3y = 12$$

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

- 300 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.

- 301 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.]

- 302 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.

- 303 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)  $2x + x^2 + 4x^3$
- 304 Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation  $y = 5000(0.98)^x$  represents the value,  $y$ , of one account that was left inactive for a period of  $x$  years. What is the  $y$ -intercept of this equation and what does it represent?
- 1) 0.98, the percent of money in the account initially
  - 2) 0.98, the percent of money in the account after  $x$  years
  - 3) 5000, the amount of money in the account initially
  - 4) 5000, the amount of money in the account after  $x$  years
- 305 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)  $-2x^2 + x - 5$
- 306 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
- 307 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.

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

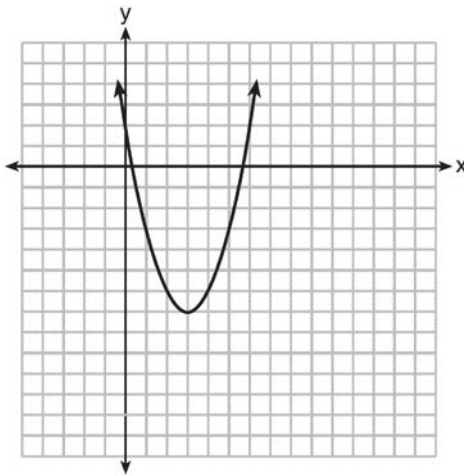
$$y + 3x = -4$$

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

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

- 309 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)  $y = |x - 8| + 2$

- 310 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.

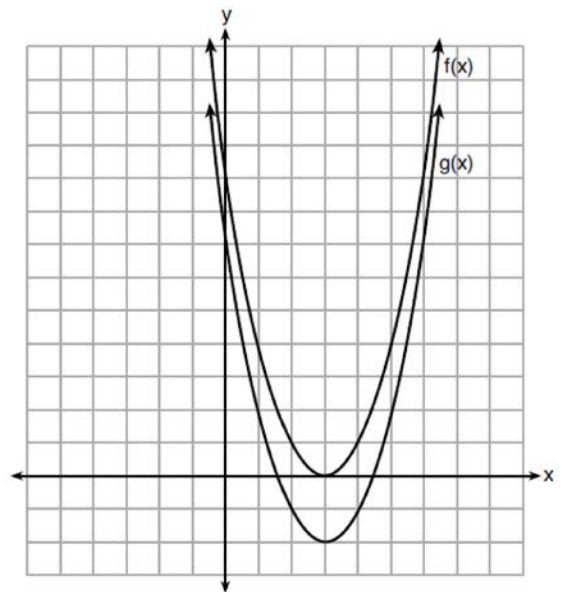
- 311 When solving the equation

$$12x^2 - 7x = 6 - 2(x^2 - 1),$$

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

- 312 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

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

<b>Year</b>	1898	1971	1985	2006	2012
<b>Cost (¢)</b>	1	6	14	24	35

- 1) 1898-1971  
 2) 1971-1985  
 3) 1985-2006  
 4) 2006-2012
- 314 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

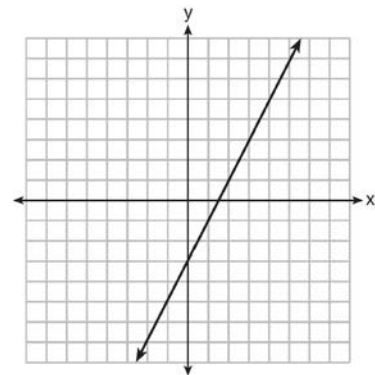
<b>Mathematics</b>	55	93	89	60	90	45	64	76	89
<b>Physics</b>	66	89	94	52	84	56	66	73	92

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.

- 315 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)  $\{-16, -4\}$

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



- 316 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.

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



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318 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)  $2x^2 - 4$

319 The graphs of  $y = x^2 - 3$  and  $y = 3x - 4$  intersect at approximately

- 1)  $(0.38, -2.85)$ , only
- 2)  $(2.62, 3.85)$ , only
- 3)  $(0.38, -2.85)$  and  $(2.62, 3.85)$
- 4)  $(0.38, -2.85)$  and  $(3.85, 2.62)$

320 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

321 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)  $\frac{P_1 V_2}{V_1}$

322 Which table of values represents a linear relationship?

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

1)

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

2)

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

3)

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

4)

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

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

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- 324 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.

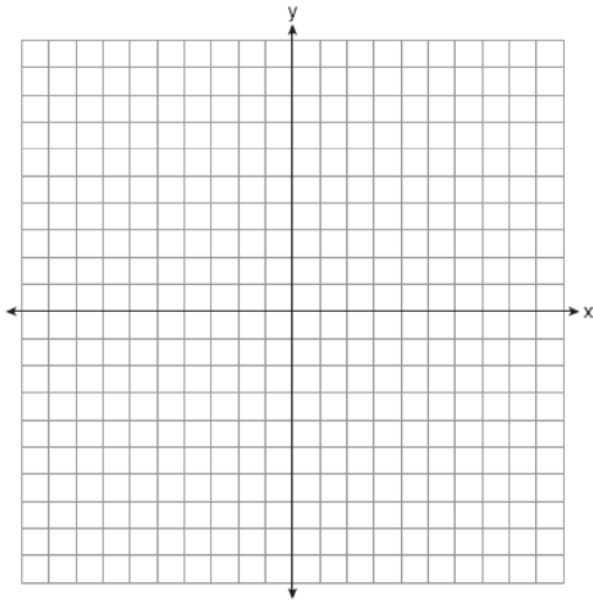
- 325 Jill invests \$400 in a savings bond. The value of the bond,  $V(x)$ , in hundreds of dollars after  $x$  years is illustrated in the table below.

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

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

- 1)  $V(x) = 4(0.65)^x$  and it grows.
- 2)  $V(x) = 4(0.65)^x$  and it decays.
- 3)  $V(x) = 4(1.35)^x$  and it grows.
- 4)  $V(x) = 4(1.35)^x$  and it decays.
- 326 Given  $7x + 2 \geq 58$ , which number is *not* in the solution set?
- 1) 6
- 2) 8
- 3) 10
- 4) 12
- 327 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
- 328 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
- 329 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)  $2(3x - 25)(3x + 25)$

- 330 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.

- 331 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.
- 332 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.

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

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

- 335 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.

- 336 State whether the product of  $\sqrt{3}$  and  $\sqrt{9}$  is rational or irrational. Explain your answer.

- 337 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

- 338 The zeros of the function  $f(x) = x^3 - 9x^2$  are
- 1) 9, only
  - 2) 0 and 9
  - 3) 0 and 3, only
  - 4)  $-3$ , 0, and 3

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

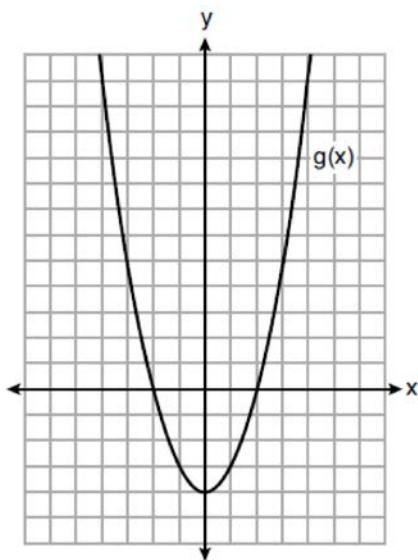
Sale Price, $p$ (in thousands of dollars)	160	180	200	220	240	260	280
Number of New Homes Available $f(p)$	126	103	82	75	82	40	20

State the linear regression function,  $f(p)$ , that estimates the number of new homes available at a specific sale price,  $p$ . Round all values to the *nearest hundredth*. State the correlation coefficient of the data to the *nearest hundredth*. Explain what this means in the context of the problem.

- 340 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
- 341 Britney is solving a quadratic equation. Her first step is shown below.
- Problem:  $3x^2 - 8 - 10x = 3(2x + 3)$
- Step 1:  $3x^2 - 10x - 8 = 6x + 9$
- Which two properties did Britney use to get to step 1?
- I. addition property of equality
  - II. commutative property of addition
  - III. multiplication property of equality
  - IV. distributive property of multiplication over addition
- 1) I and III
  - 2) I and IV
  - 3) II and III
  - 4) II and IV
- 342 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
- 343 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.

344 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.

345 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  $x = -4$ .

346 A recursively defined sequence is shown below.

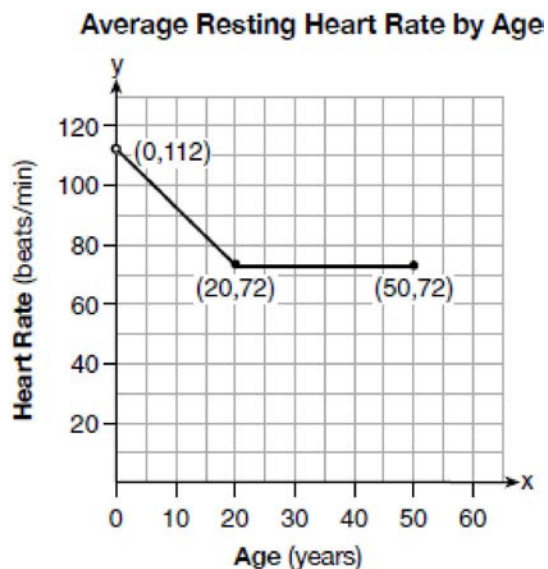
$$a_1 = 5$$

$$a_{n+1} = 2a_n - 7$$

The value of  $a_4$  is

- 1) -9
- 2) -1
- 3) 8
- 4) 15

347 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.



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.

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- 348 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.

- 349 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.

- 350 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.
- 351 Given the parent function  $f(x) = x^3$ , the function  $g(x) = (x - 1)^3 - 2$  is the result of a shift of  $f(x)$
- 1) 1 unit left and 2 units down  
 2) 1 unit left and 2 units up  
 3) 1 unit right and 2 units down  
 4) 1 unit right and 2 units up
- 352 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)  $(x - 6)(x - 4)$

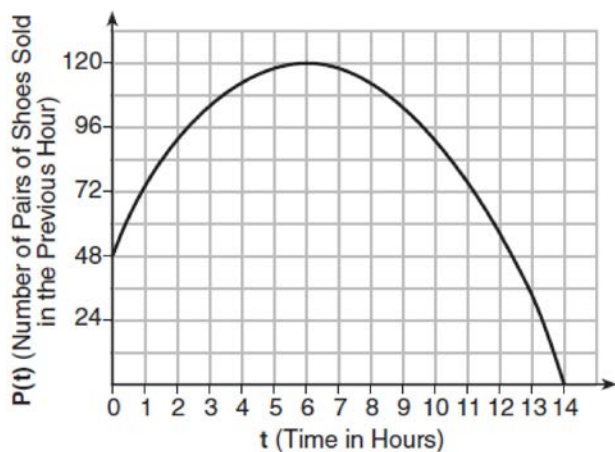
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353 Two functions,  $y = |x - 3|$  and  $3x + 3y = 27$ , are graphed on the same set of axes. Which statement is true about the solution to the system of equations?

- 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.

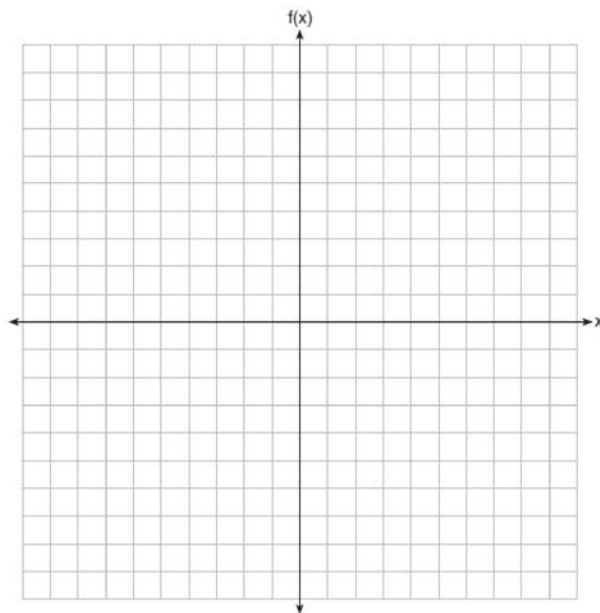
354 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.



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.

355 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.

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



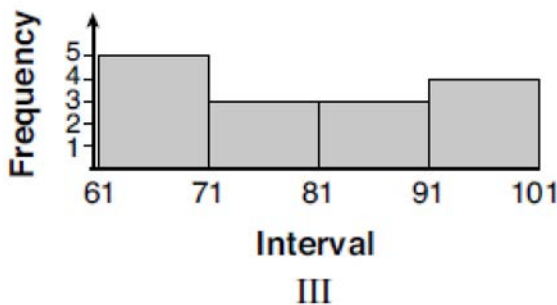
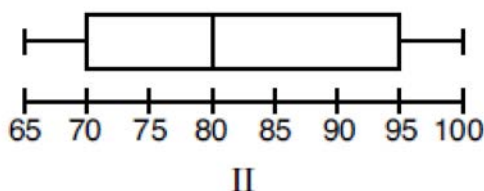
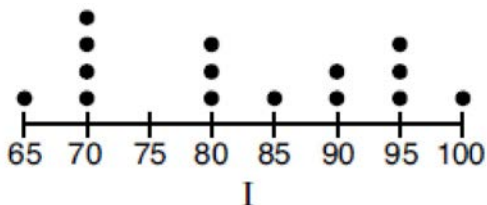
357 Last weekend, Emma sold lemonade at a yard sale. The function  $P(c) = .50c - 9.96$  represented the profit,  $P(c)$ , Emma earned selling  $c$  cups of lemonade. Sales were strong, so she raised the price for this weekend by 25 cents per cup. Which function represents her profit for this weekend?

- 1)  $P(c) = .25c - 9.96$
- 2)  $P(c) = .50c - 9.71$
- 3)  $P(c) = .50c - 10.21$
- 4)  $P(c) = .75c - 9.96$

358 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

359 Fred's teacher gave the class the quadratic function

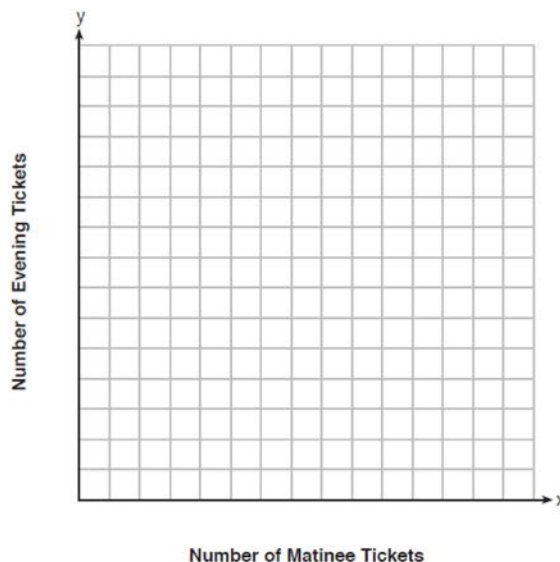
$$f(x) = 4x^2 + 16x + 9.$$

- 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*.

360 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

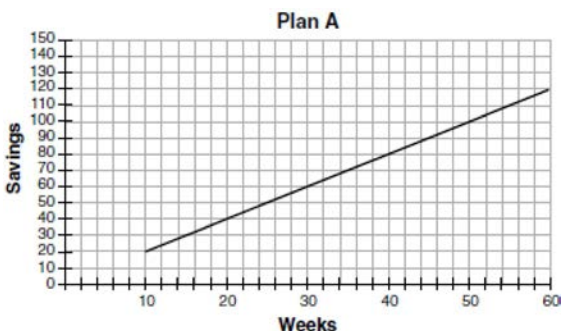
361 Miranda received a movie gift card for \$100 to her local theater. Matinee tickets cost \$7.50 each and evening tickets cost \$12.50 each. If  $x$  represents the number of matinee tickets she could purchase, and  $y$  represents the number of evening tickets she could purchase, write an inequality that represents all the possible ways Miranda 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 Miranda could purchase with her gift card? Explain your answer.



- 362 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

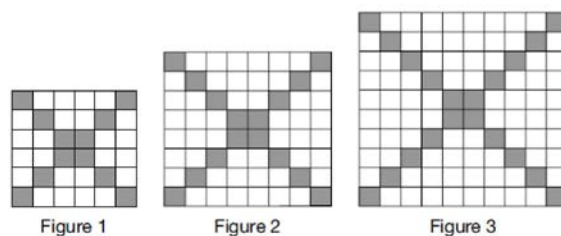
- 1) correct, because Plan B is an exponential function and will increase at a faster rate
  - 2) correct, because Plan B is a quadratic function and will increase at a faster rate
  - 3) incorrect, because Plan A will have a higher value after 1 year
  - 4) incorrect, because Plan B is a quadratic function and will increase at a slower rate
- 363 Given that  $a > b$ , solve for  $x$  in terms of  $a$  and  $b$ :
- $$b(x - 3) \geq ax + 7b$$

- 364 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.

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

- 366 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?

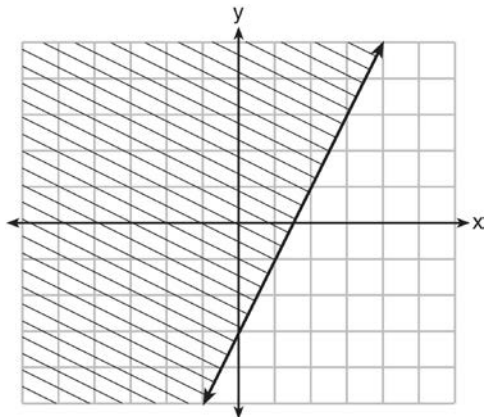
- 1) 55
  - 2) 148
  - 3) 420
  - 4) 805
- 367 Which pair of equations could *not* be used to solve the following equations for  $x$  and  $y$ ?

$$4x + 2y = 22$$

$$-2x + 2y = -8$$

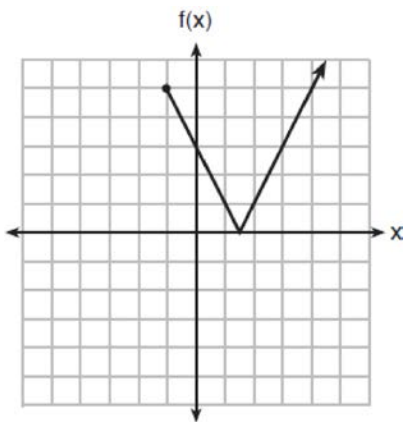
- 1)  $4x + 2y = 22$   
 $2x - 2y = 8$
- 2)  $4x + 2y = 22$   
 $-4x + 4y = -16$
- 3)  $12x + 6y = 66$   
 $6x - 6y = 24$
- 4)  $8x + 4y = 44$   
 $-8x + 8y = -8$

368 The graph of an inequality is shown below.



- Write the inequality represented by the graph.
- On the same set of axes, graph the inequality  $x + 2y < 4$ .
- 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.

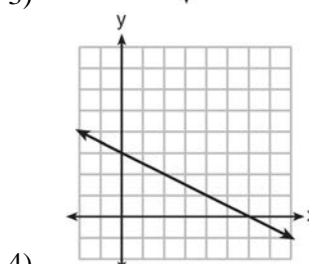
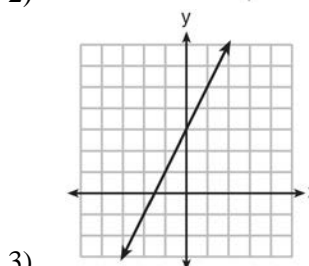
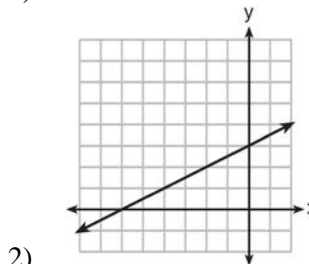
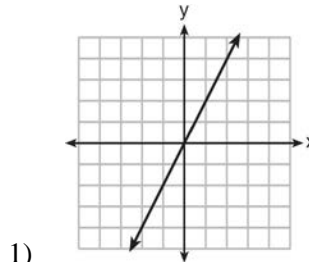
369 The function  $f(x)$  is graphed below.



The domain of this function is

- all positive real numbers
- all positive integers
- $x \geq 0$
- $x \geq -1$

370 Which graph shows a line where each value of  $y$  is three more than half of  $x$ ?



371 Which recursively defined function represents the sequence  $3, 7, 15, 31, \dots$ ?

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

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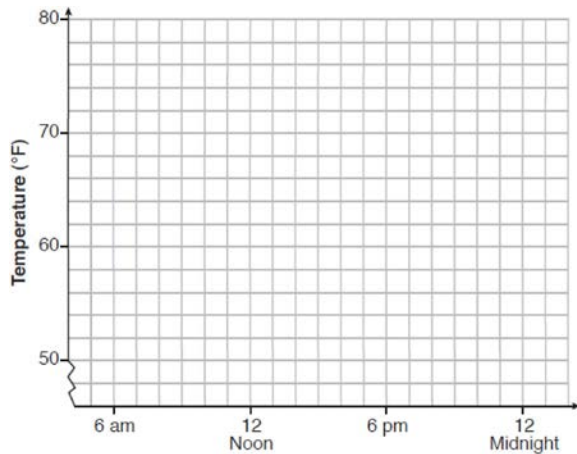
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372 Jacob and Zachary go to the movie theater and purchase refreshments for their friends. Jacob spends a total of \$18.25 on two bags of popcorn and three drinks. Zachary spends a total of \$27.50 for four bags of popcorn and two drinks. Write a system 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*.

373 One spring day, Elroy noted the time of day and the temperature, in degrees Fahrenheit. His findings are stated below.

At 6 a.m., the temperature was 50°F. For the next 4 hours, the temperature rose 3° per hour. The next 6 hours, it rose 2° per hour. The temperature then stayed steady until 6 p.m. For the next 2 hours, the temperature dropped 1° per hour. The temperature then dropped steadily until the temperature was 56°F at midnight.

On the set of axes below, graph Elroy's data.



State the entire time interval for which the temperature was increasing. Determine the average rate of change, in degrees per hour, from 6:00 p.m. to midnight.

374 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)  $(p + 3)(p - 3)(p + 3)(p - 3)$

375 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  $n$ .

376 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.

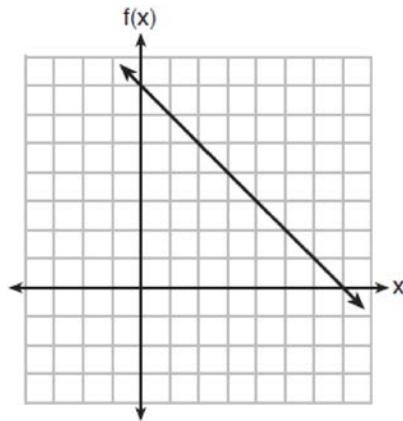
377 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

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

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)  $\frac{60 \text{ min}}{1 \text{ hr}}$

378 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  $p(x)$

379 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.

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

- 1)  $-2g - 1$
- 2)  $-2g - 5$
- 3)  $-2g - 7$
- 4)  $-2g - 11$

380 The product of  $\sqrt{576}$  and  $\sqrt{684}$  is

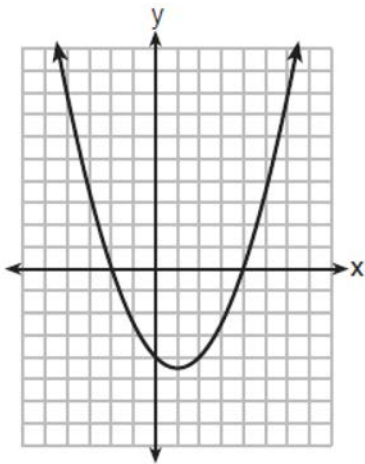
- 1) irrational because both factors are irrational
- 2) rational because both factors are rational
- 3) irrational because one factor is irrational
- 4) rational because one factor is rational

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

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

- 383 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

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

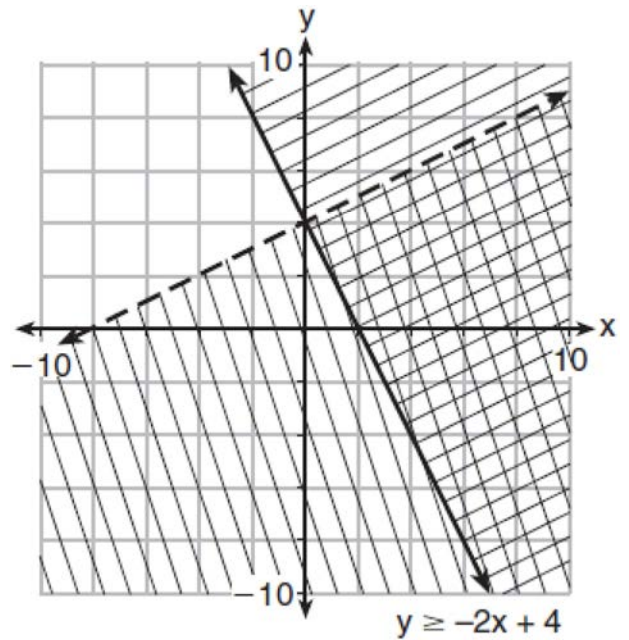


Which of these points can determine the zeros of

the equation  $y = \frac{1}{2}x^2 - x - 4$ ?

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

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



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

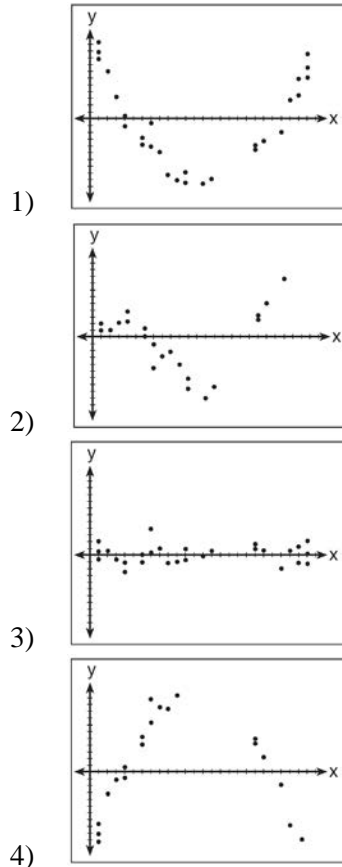
- 1)  $x > 9$
- 2)  $x > -\frac{3}{5}$
- 3)  $x < 9$
- 4)  $x < -\frac{3}{5}$

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



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



394 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

395 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

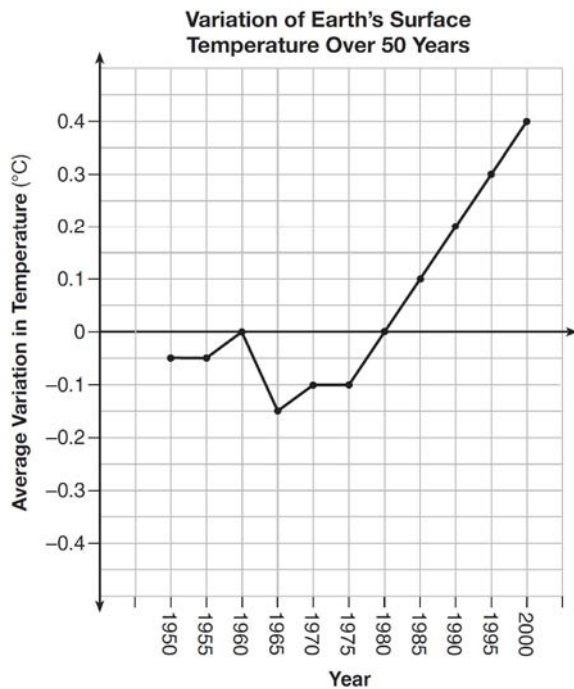
396 Which situation could be modeled as a linear equation?

- 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.

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

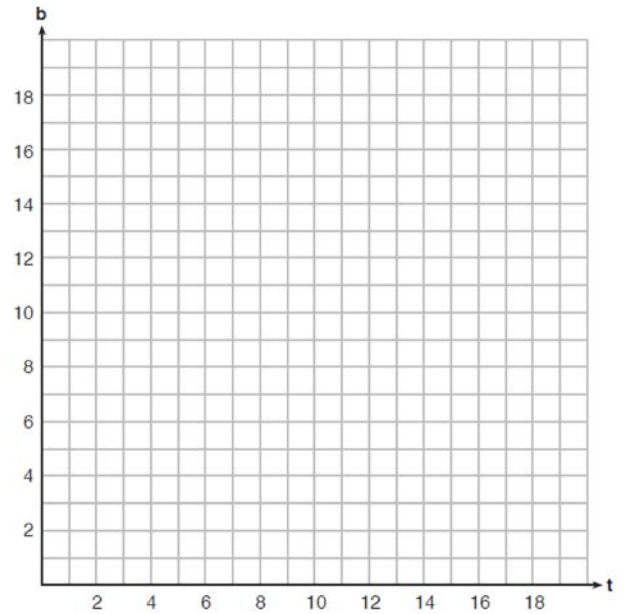
398 The graph below shows the variation in the average temperature of Earth's surface from 1950-2000, according to one source.



During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

399 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.

400 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.





Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

405 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

406 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.

407 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.

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

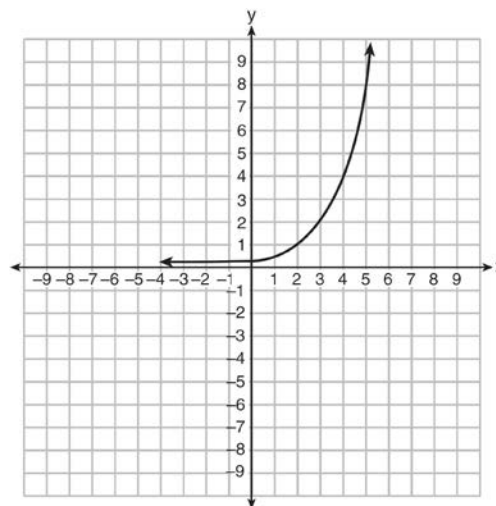
409 Andy has \$310 in his account. Each week,  $w$ , he withdraws \$30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?

- 1)  $310 - 8w$
- 2)  $280 + 30(w - 1)$
- 3)  $310w - 30$
- 4)  $280 - 30(w - 1)$

410 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

411 Write an exponential equation for the graph shown below.

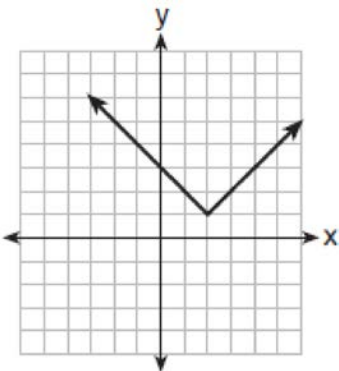


Explain how you determined the equation.

412 Which relation does *not* represent a function?

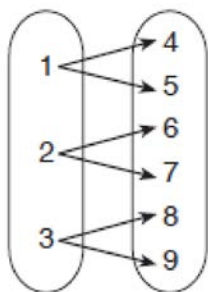
x	1	2	3	4	5	6
y	3.2	4	5.1	6	7.4	8.8

1)



2)

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



4)

413 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)  $2a^2 - a - 11$

414 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)  $45$

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

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



1)  $y = 2x + 1$

2)  $y = 2x + 3$

3)  $a_1 = 3$

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

4)  $a_1 = 1$

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

417 In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

1)  $a_1 = 49; a_n = a_{n-1} + 21$

2)  $a_1 = 0; a_n = 49a_{n-1} + 21$

3)  $a_1 = 21; a_n = a_{n-1} + 49$

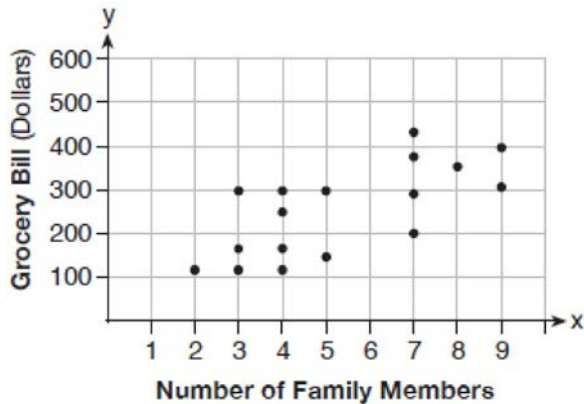
4)  $a_1 = 0; a_n = 21a_{n-1} + 49$

418 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.

419 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

420 What is the *minimum* value of the function

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

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

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

422 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.

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

- 423 The school newspaper surveyed the student body for an article about club membership. The table below shows the number of students in each grade level who belong to one or more clubs.

	<b>1 Club</b>	<b>2 Clubs</b>	<b>3 or More Clubs</b>
9 <sup>th</sup>	90	33	12
10 <sup>th</sup>	125	12	15
11 <sup>th</sup>	87	22	18
12 <sup>th</sup>	75	27	23

If there are 180 students in ninth grade, what percentage of the ninth grade students belong to more than one club?

- 424 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
- 425 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)  $-11.\overline{3}$
- 426 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
- 427 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
- 428 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
- 429 Solve the equation for  $y$ :  $(y - 3)^2 = 4y - 12$

- 430 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.

- 431 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)  $3.50H + 2.50P = 14$

$H + P = 43$

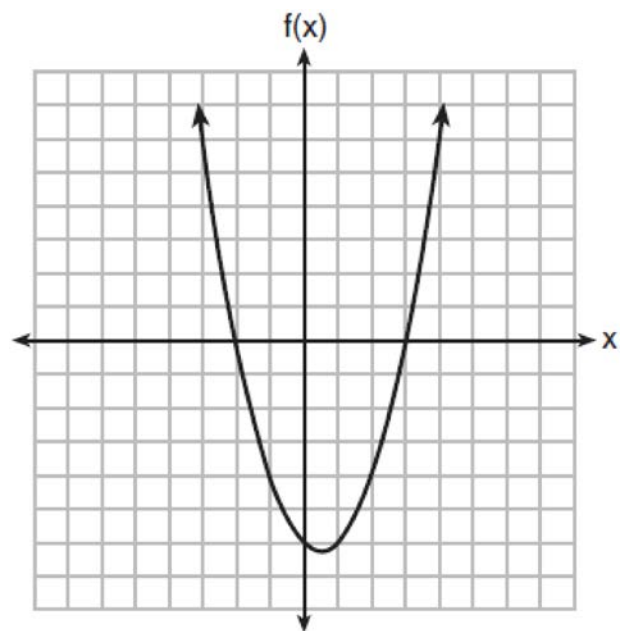
4)  $3.50P + 2.50H = 14$

$P + H = 43$

- 432 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  $M_2$ .

- 433 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.

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

434 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.

435 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.

436 What is the solution to the equation

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

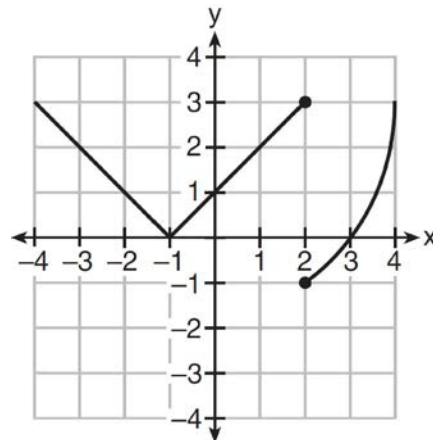
- 1)  $3.\overline{06}$
- 2)  $0.4$
- 3)  $-0.4\overline{8}$
- 4)  $-0.709\overline{3}$

437 Which equation has the same solution as

$$x^2 - 6x - 12 = 0?$$

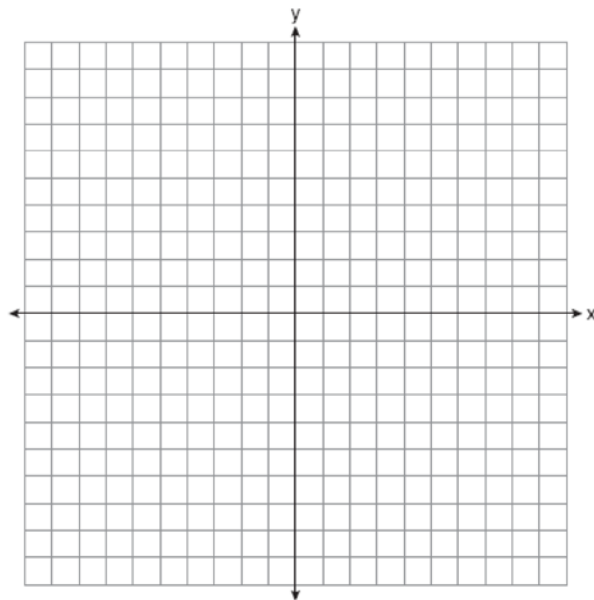
- 1)  $(x + 3)^2 = 21$
- 2)  $(x - 3)^2 = 21$
- 3)  $(x + 3)^2 = 3$
- 4)  $(x - 3)^2 = 3$

438 Marcel claims that the graph below represents a function.



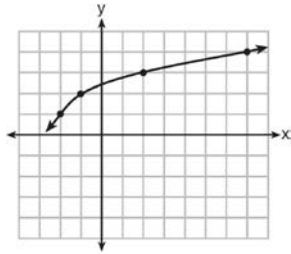
State whether Marcel is correct. Justify your answer.

439 Graph the function  $f(x) = 2^x - 7$  on the set of axes below.

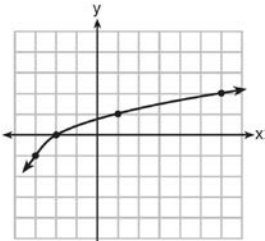


If  $g(x) = 1.5x - 3$ , determine if  $f(x) > g(x)$  when  $x = 4$ . Justify your answer.

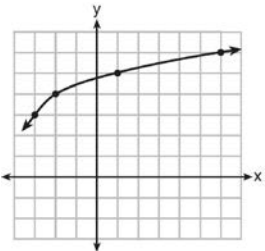
440 The graph of  $y = f(x)$  is shown below.



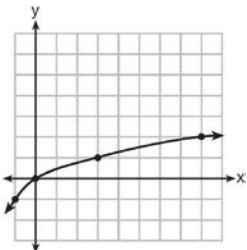
What is the graph of  $y = f(x + 1) - 2$ ?



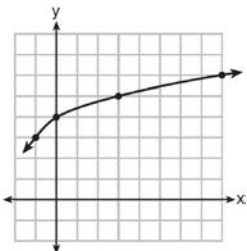
1)



2)



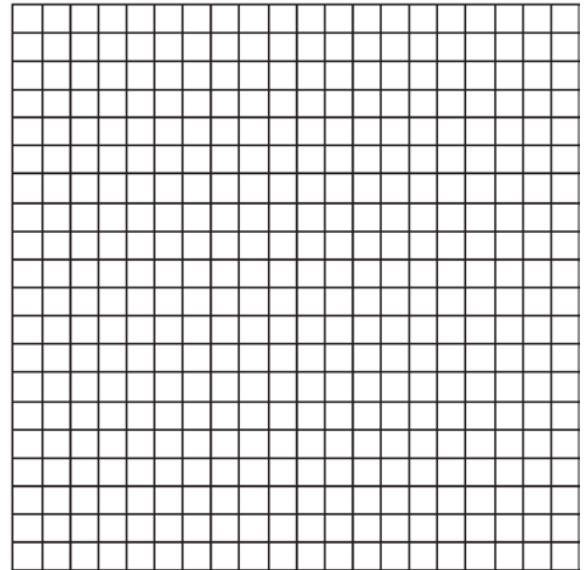
3)



4)

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

442 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.



443 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.

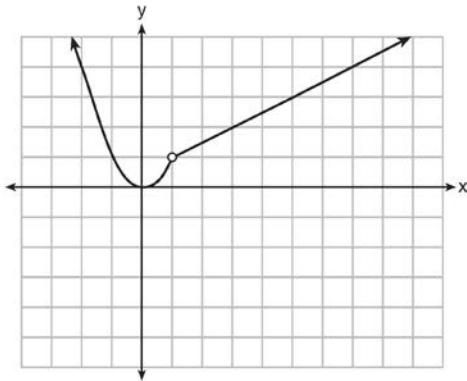
444 The length of a rectangular sign is 6 inches more than half its width. The area of this sign is 432 square inches. Write an equation in one variable that could be used to find the number of inches in the dimensions of this sign. Solve this equation algebraically to determine the dimensions of this sign, in inches.

445 Determine algebraically the zeros of  
 $f(x) = 3x^3 + 21x^2 + 36x$ .



- 446 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)  $\{0, 4, 92\}$

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

- 448 Given the following expressions:

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

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

Which expression(s) result in an irrational number?

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

- 449 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)  $3\sqrt{5} + 2\sqrt{5}$

- 450 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  $g(t)$ .

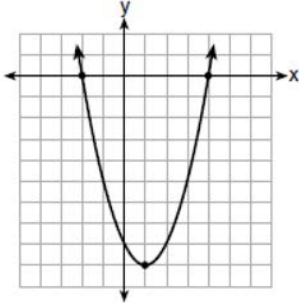
- 451 Which equation has the same solution as

$$x^2 + 8x - 33 = 0?$$

- 1)  $(x + 4)^2 = 49$
- 2)  $(x - 4)^2 = 49$
- 3)  $(x + 4)^2 = 17$
- 4)  $(x - 4)^2 = 17$

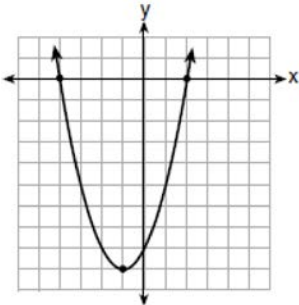
452 Which function has zeros of -4 and 2?

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



2)

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



4)

453 If a sequence is defined recursively by  $f(0) = 2$  and  $f(n + 1) = -2f(n) + 3$  for  $n \geq 0$ , then  $f(2)$  is equal to

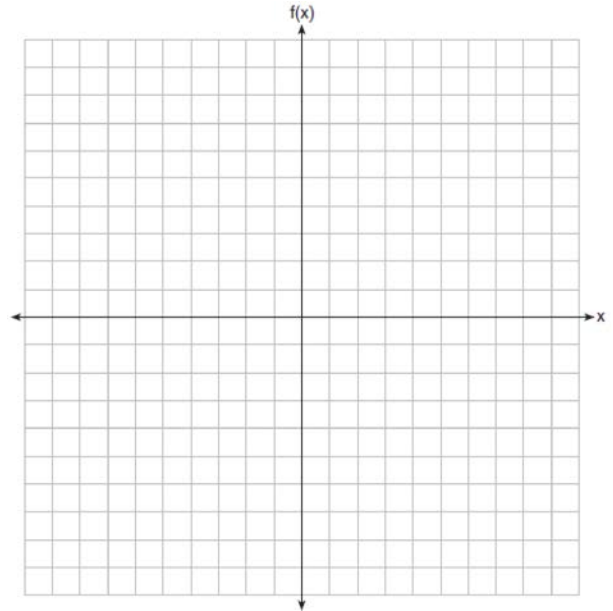
- 1) 1
- 2) -11
- 3) 5
- 4) 17

454 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)  $6x^2 - 6x - 11$

455 Graph the following function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -3 \leq x < 1 \\ 4, & 1 \leq x \leq 8 \end{cases}$$



456 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)  $(15)(18) = 120 + x^2$

457 Which equation has the same solutions as

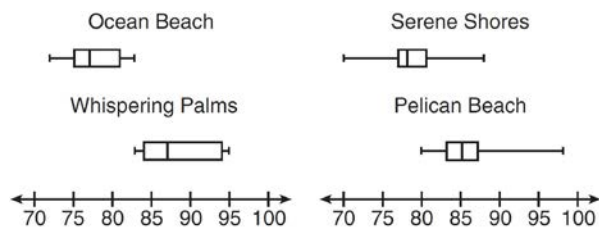
$$2x^2 + x - 3 = 0$$

- 1)  $(2x - 1)(x + 3) = 0$
- 2)  $(2x + 1)(x - 3) = 0$
- 3)  $(2x - 3)(x + 1) = 0$
- 4)  $(2x + 3)(x - 1) = 0$

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

- 458 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?

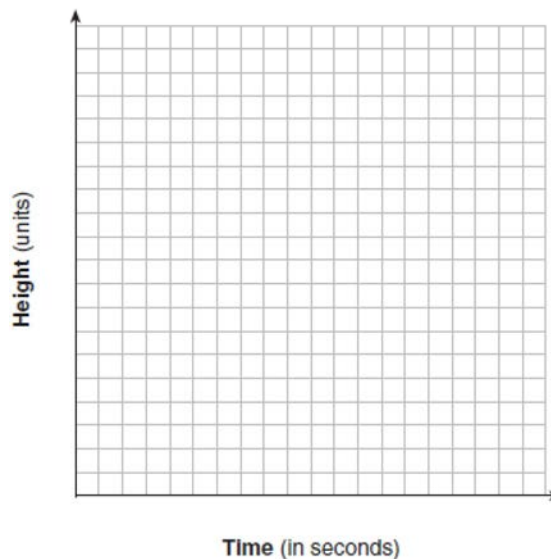
- 1) Ocean Beach
  - 2) Whispering Palms
  - 3) Serene Shores
  - 4) Pelican Beach
- 459 Ian is borrowing \$1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of \$60 per month. Ken is borrowing \$600 from his parents to purchase a snowboard. He plans to pay his parents 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.

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

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

- 462 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)  $-4(x^3 - 2) + x(x - 6)$

- 463 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.

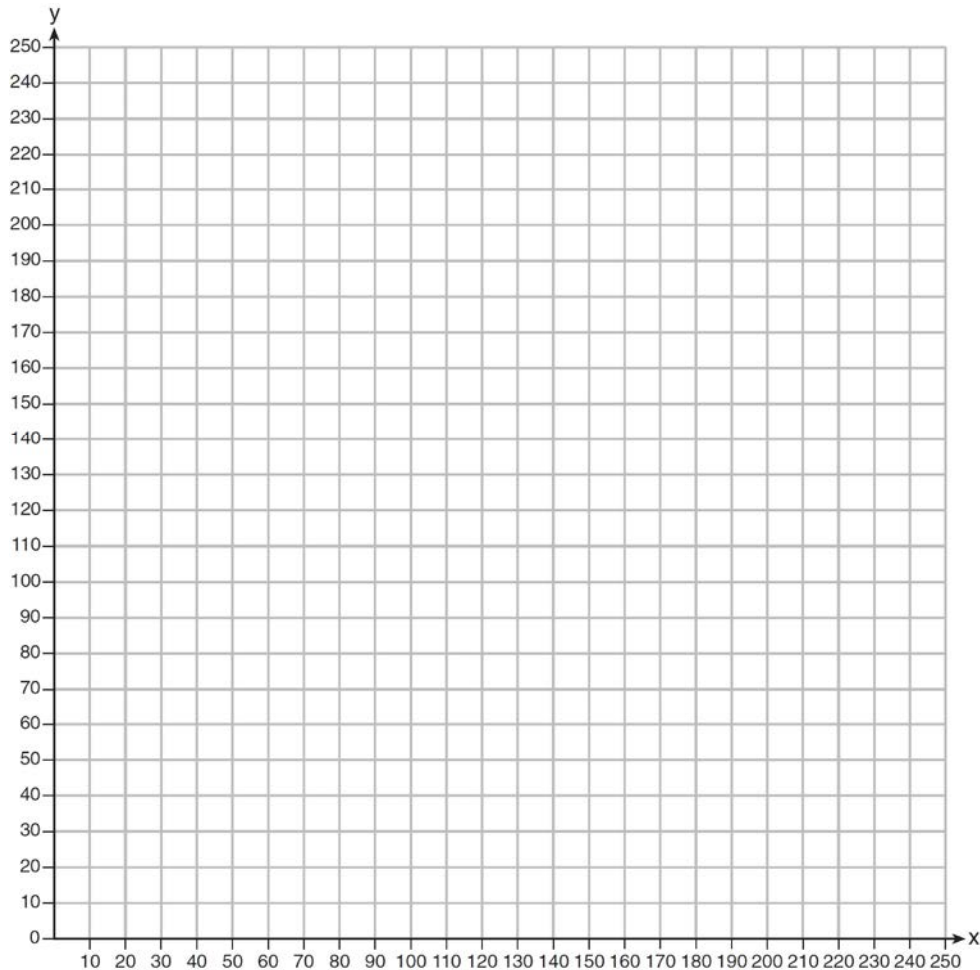


State the coordinates of the vertex and explain its meaning in the context of the problem.

Algebra I Regents Exam Questions at Random

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464 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.



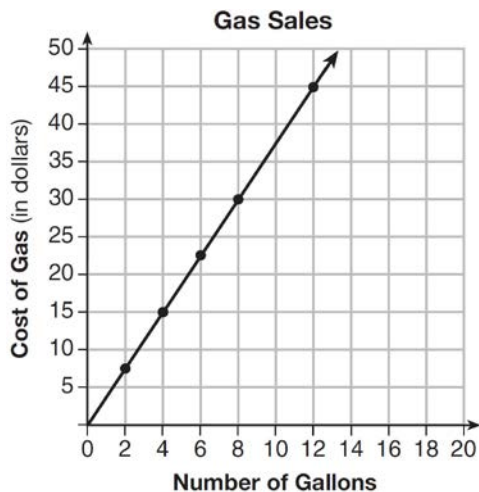
465 The solutions to  $(x + 4)^2 - 2 = 7$  are

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

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

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



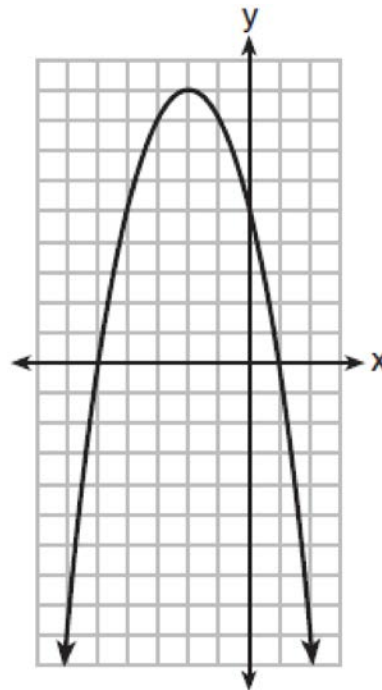
Which statement can be justified by using the graph?

- 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.

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

469 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

470 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?

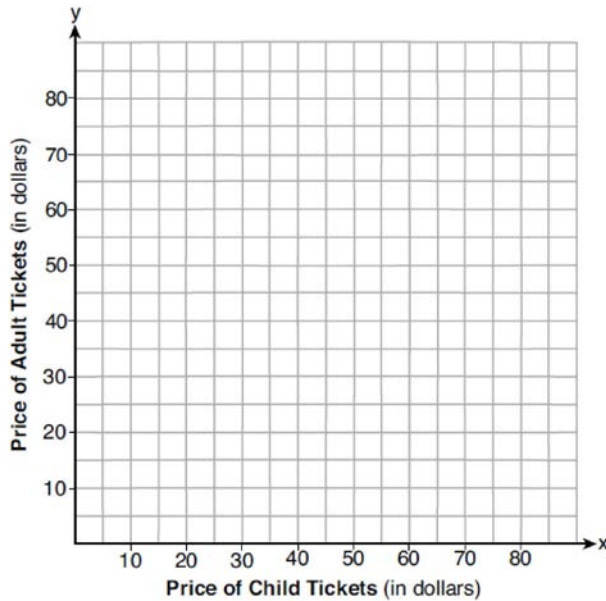
- 1) minutes per foot
- 2) minutes per inch
- 3) feet per minute
- 4) inches per minute

471 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

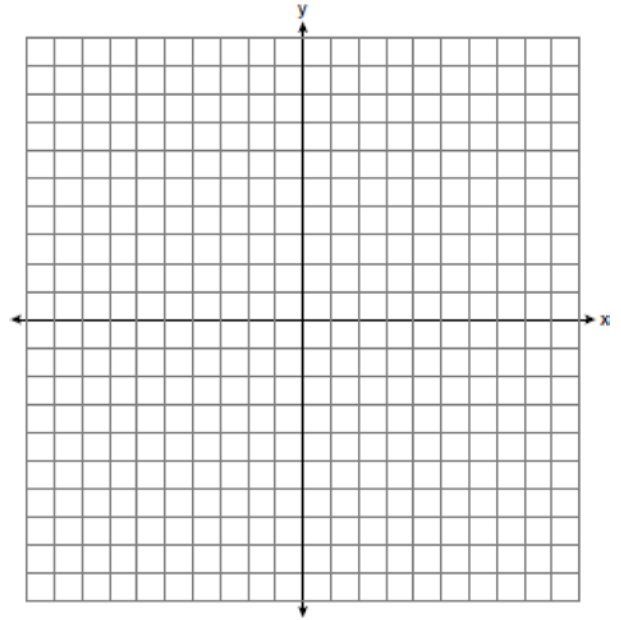
Determine whether  $t(x)$  is linear or exponential. Explain your answer.

472 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.

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



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



**Algebra I Regents at Random**

- 482 The percentage of students scoring 85 or better on a mathematics final exam and an English final exam during a recent school year for seven schools is shown in the table below.

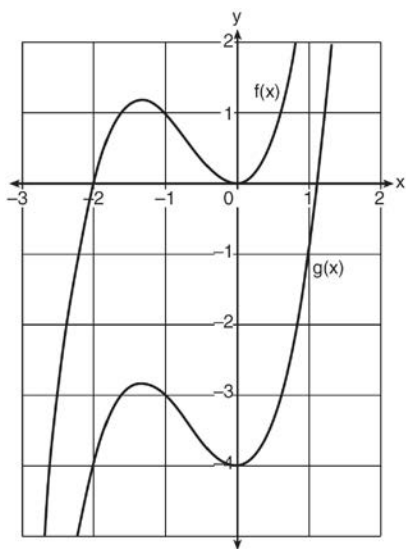
Percentage of Students Scoring 85 or Better	
Mathematics, $x$	English, $y$
27	46
12	28
13	45
10	34
30	56
45	67
20	42

Write the linear regression equation for these data, rounding all values to the *nearest hundredth*. State the correlation coefficient of the linear regression equation, to the *nearest hundredth*. Explain the meaning of this value in the context of these data.

- 483 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)  $c = 60 + 0.05d$
- 484 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.
- 485 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.
- 486 The solution to  $3(x - 8) + 4x = 8x + 4$  is
- 1) 12
  - 2) 28
  - 3) -12
  - 4) -28

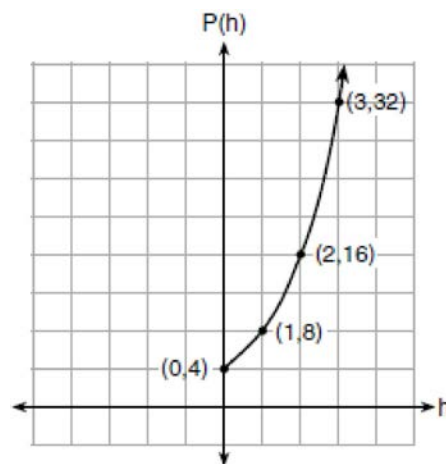


- 487 In the diagram below,  $f(x) = x^3 + 2x^2$  is graphed. Also graphed is  $g(x)$ , the result of a translation of  $f(x)$ .



Determine an equation of  $g(x)$ . Explain your reasoning.

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



Which equation represents the graph of  $P(h)$ ?

- 1)  $P(h) = 4(2)^h$
- 2)  $P(h) = \frac{46}{5}h + \frac{6}{5}$
- 3)  $P(h) = 3h^2 + 0.2h + 4.2$
- 4)  $P(h) = \frac{2}{3}h^3 - h^2 + 3h + 4$

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

Year	2013	2014	2015	2016
Population	3810	3943	4081	4224

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

- I.  $a = 3810$
  - II.  $a = 4224$
  - III.  $b = 0.035$
  - IV.  $b = 1.035$
- 1) I and III
  - 2) I and IV
  - 3) II and III
  - 4) II and IV

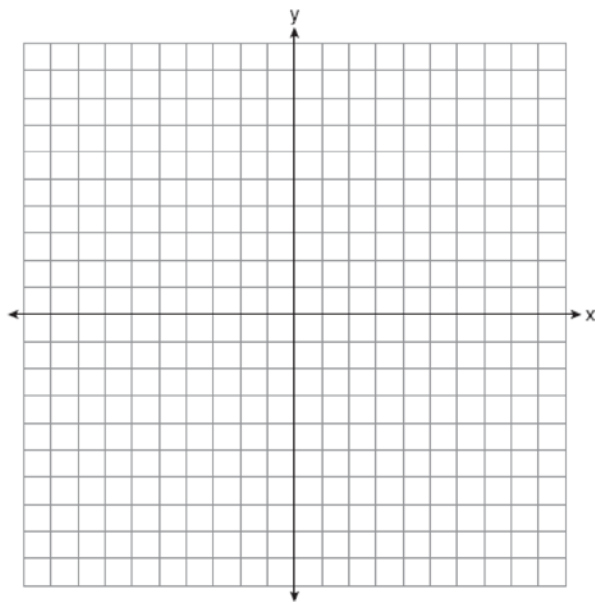
490 The tables below show the values of four different functions for given values of  $x$ .

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

Which table represents a linear function?

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

491 Draw the graph of  $y = \sqrt{x} - 1$  on the set of axes below.



492 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)  $19x^2 + 34x - 29$

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

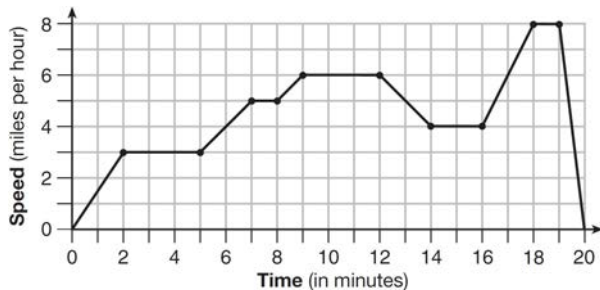
- 1)  $1.50(5) + 2.00m \geq 19.00$
- 2)  $1.50(5) + 2.00m \leq 19.00$
- 3)  $1.50c + 2.00(5) \geq 19.00$
- 4)  $1.50c + 2.00(5) \leq 19.00$

494 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)  $C(t) = 240(1.986)^{\frac{t}{24}}$

495 Solve  $5x^2 = 180$  algebraically.

- 496 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.
- 497 Determine if the product of  $3\sqrt{2}$  and  $8\sqrt{18}$  is rational or irrational. Explain your answer.

498 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

499 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

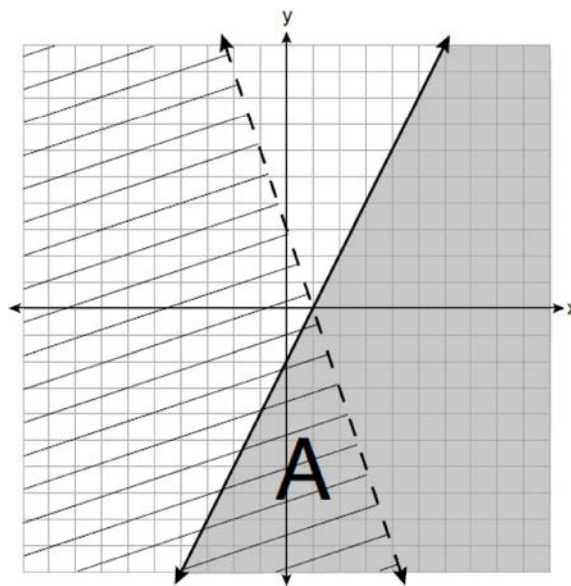
500 Keith determines the zeros of the function  $f(x)$  to be  $-6$  and  $5$ . What could be Keith's function?

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

501 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)  $(w^2 + 6)(w^2 - 6)$

502 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.

Algebra I Regents Exam Questions at Random

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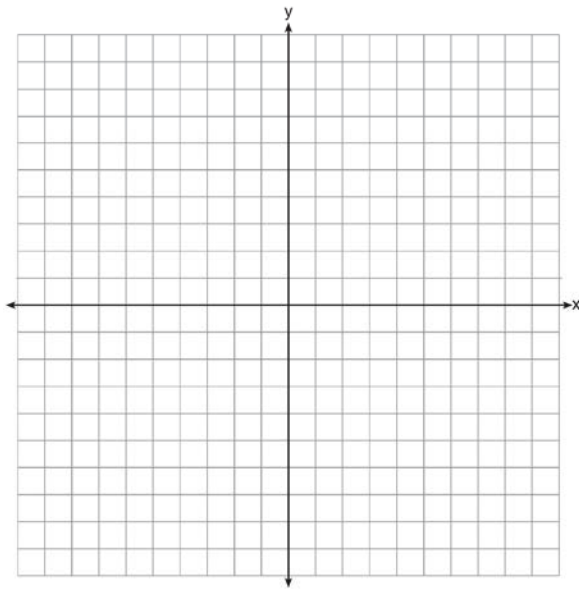
503 The table below shows the annual salaries for the 24 members of a professional sports team in terms of millions of dollars.

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.

504 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  $y = |x|$ .

505 The solution to  $4p + 2 < 2(p + 5)$  is

- 1)  $p > -6$
- 2)  $p < -6$
- 3)  $p > 4$
- 4)  $p < 4$

506 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  $-1$

507 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  $-2$

508 The table below shows the number of hours ten students spent studying for a test and their scores.

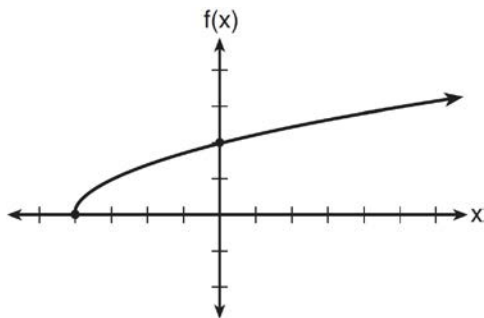
<b>Hours Spent Studying (<math>x</math>)</b>	0	1	2	4	4	4	6	6	7	8
<b>Test Scores (<math>y</math>)</b>	35	40	46	65	67	70	82	88	82	95

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.

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

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

- 510 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)  $\{x | x \geq -4\}$

- 512 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.

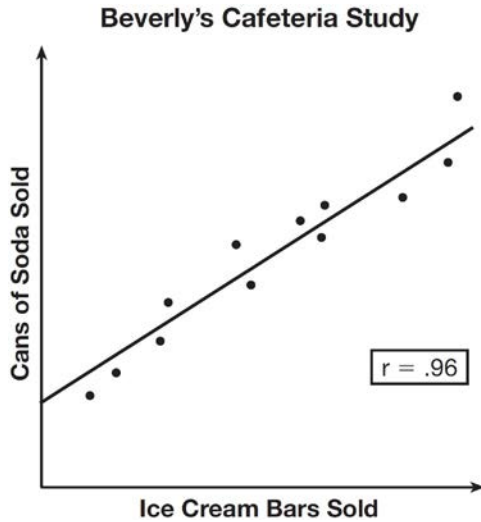
- 513 Given the following three sequences:

- I. 2, 4, 6, 8, 10...
- II. 2, 4, 8, 16, 32...
- III.  $a, a + 2, a + 4, a + 6, a + 8...$

Which ones are arithmetic sequences?

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

514 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

515 If  $f(x) = x^2 + 2$ , which interval describes the range of this function?

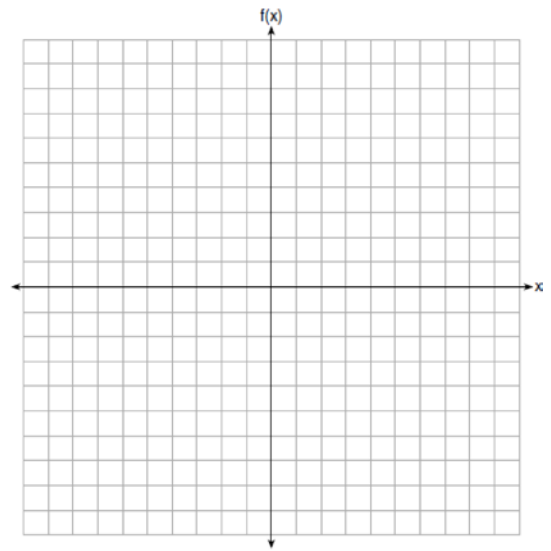
- 1)  $(-\infty, \infty)$
- 2)  $[0, \infty)$
- 3)  $[2, \infty)$
- 4)  $(-\infty, 2]$

516 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.

517 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

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



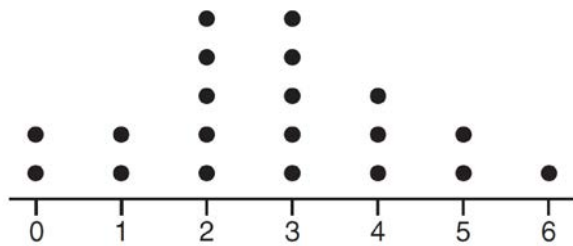
State the coordinates of the vertex of the graph.

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

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

520 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.

521 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.

522 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?

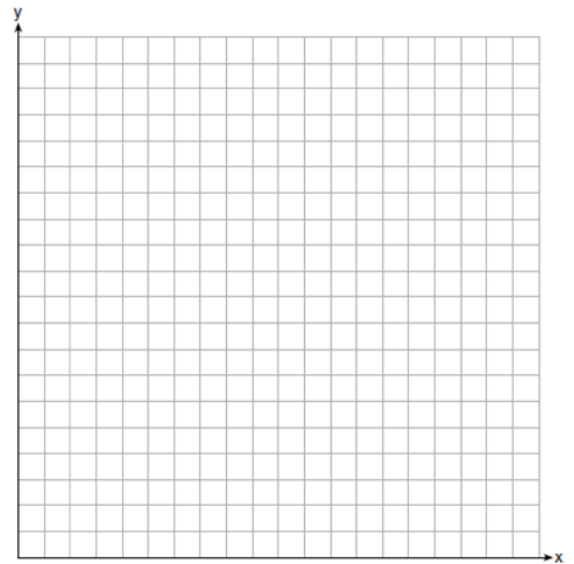
- 1)  $6x^5 + x^4 + 7$
- 2)  $7x^6 - 6x^4 + 5$
- 3)  $6x^7 - x^5 + 5$
- 4)  $7x^5 + 2x^2 + 6$

523 Given:  $g(x) = 2x^2 + 3x + 10$

$$k(x) = 2x + 16$$

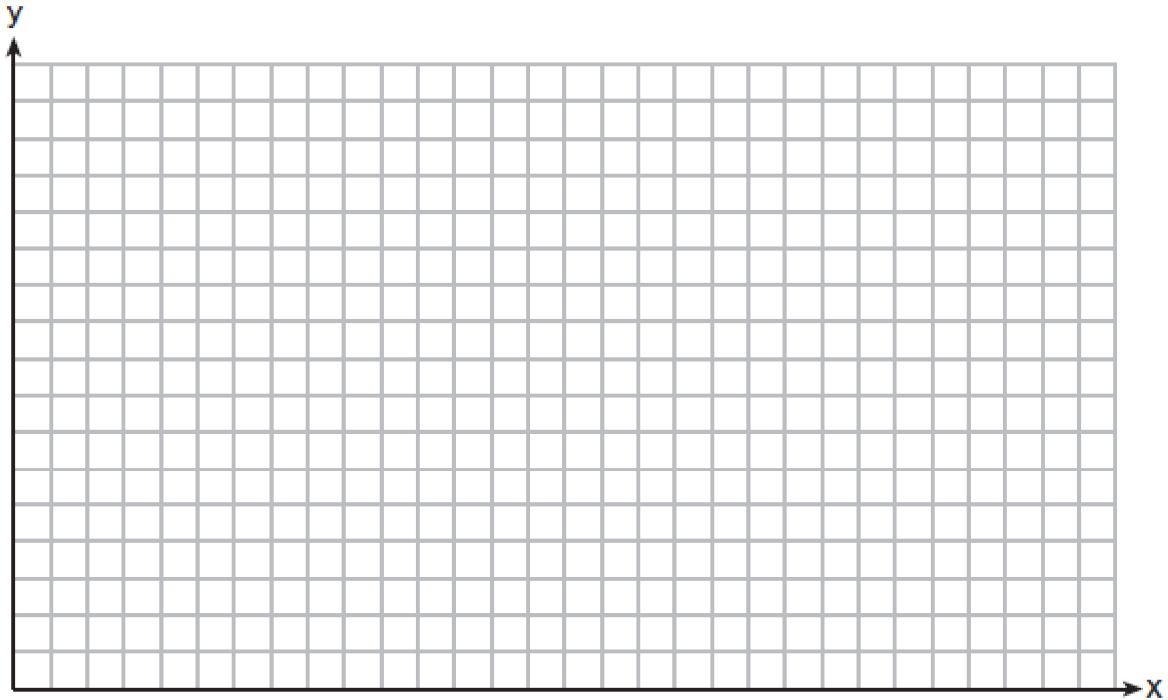
Solve the equation  $g(x) = 2k(x)$  algebraically for  $x$ , to the *nearest tenth*. Explain why you chose the method you used to solve this quadratic equation.

524 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.

- 525 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.

- 526 Which table represents a function?

1) 

<b>x</b>	2	4	2	4
<b>f(x)</b>	3	5	7	9

2) 

<b>x</b>	0	-1	0	1
<b>f(x)</b>	0	1	-1	0

3) 

<b>x</b>	3	5	7	9
<b>f(x)</b>	2	4	2	4

4) 

<b>x</b>	0	1	-1	0
<b>f(x)</b>	0	-1	0	1

- 527 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)  $A = 1000(1 + 1.3)^2$



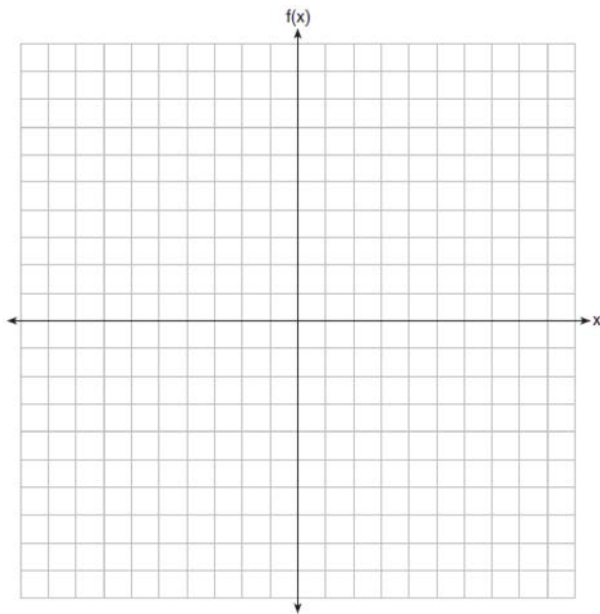
- 528 A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

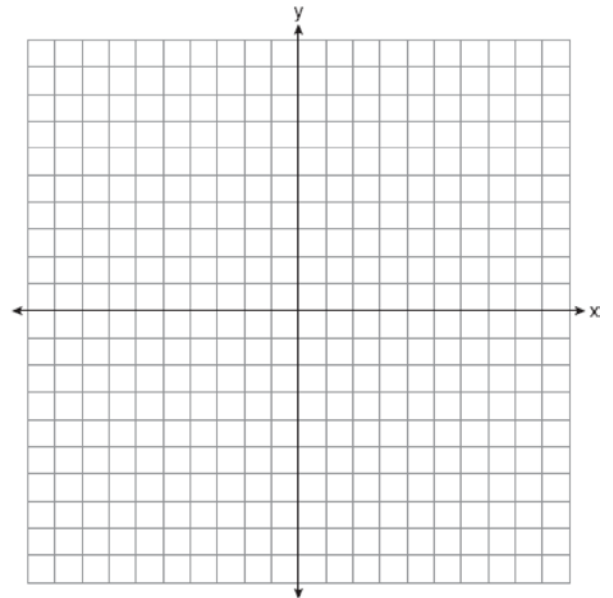
Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greater rate of snowfall, in inches per hour? Justify your answer.

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

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

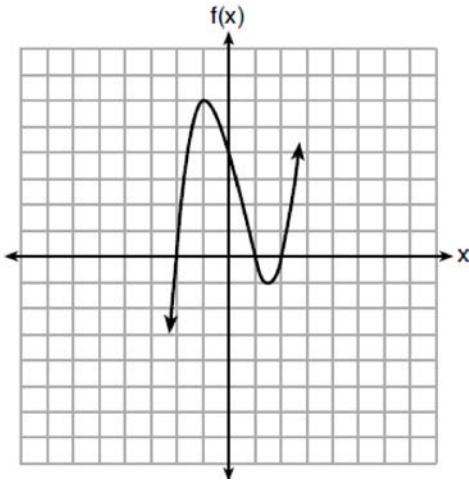


- 530 On the set of axes below, draw the graph of  $y = x^2 - 4x - 1$ .



State the equation of the axis of symmetry.

531 A polynomial function is graphed below.



Which function could represent this graph?

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

532 If the area of a rectangle is expressed as  $x^4 - 9y^2$ , then the product of the length and the width of the rectangle could be expressed as

- 1)  $(x - 3y)(x + 3y)$
- 2)  $(x^2 - 3y)(x^2 + 3y)$
- 3)  $(x^2 - 3y)(x^2 - 3y)$
- 4)  $(x^4 + y)(x - 9y)$

533 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%

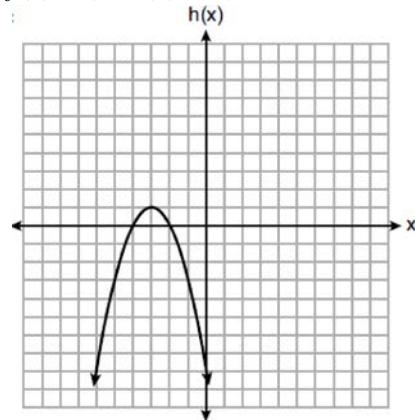
534 Nicci's sister is 7 years less than twice Nicci's age,  $a$ . The sum of Nicci's age and her sister's age is 41. Which equation represents this relationship?

- 1)  $a + (7 - 2a) = 41$
- 2)  $a + (2a - 7) = 41$
- 3)  $2a - 7 = 41$
- 4)  $a = 2a - 7$

535 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.

536 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)  $-4x^2 + 3x^4 - 4$

537 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

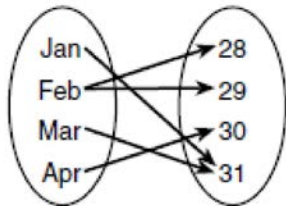
State if Caleb is correct. Explain your reasoning.

538 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.

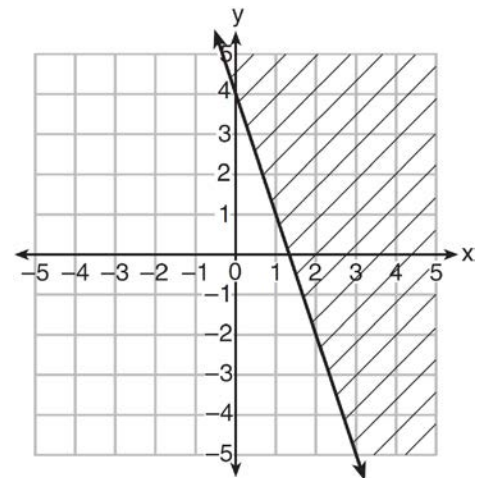
539 A mapping is shown in the diagram below.



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

540 Which inequality is represented in the graph below?



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

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- 541 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.

- 542 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.

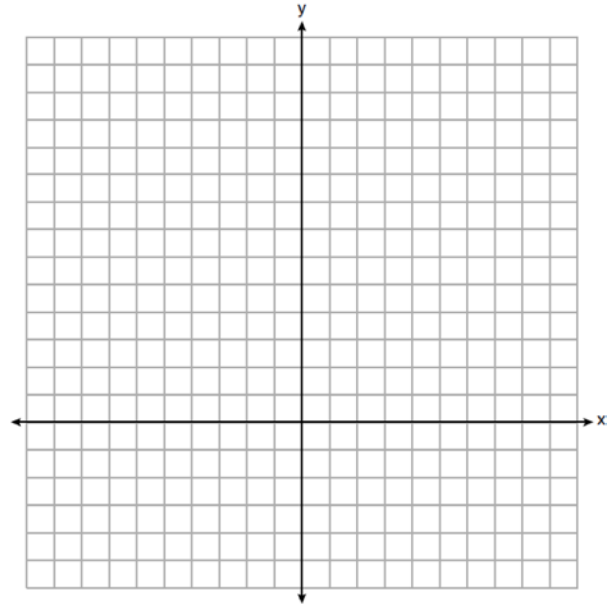
	<b>Watch Sports</b>	<b>Don't Watch Sports</b>	<b>Total</b>
<b>Like Pop</b>			
<b>Don't Like Pop</b>			
<b>Total</b>			

- 543 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)  $500 + 500(.04) + 520(.04) + 540.8(.04)$
- 544 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
- 545 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?
- 546 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.

- 547 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)
- 548 The acidity in a swimming pool is considered normal if the average of three pH readings,  $p$ , is defined such that  $7.0 < p < 7.8$ . If the first two readings are 7.2 and 7.6, which value for the third reading will result in an overall rating of normal?
- 1) 6.2
  - 2) 7.3
  - 3) 8.6
  - 4) 8.8
- 549 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)  $m + g \geq 40$   
 $12m + 14g \geq 250$

- 550 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  $f(x) = g(x)$ .

- 551 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.

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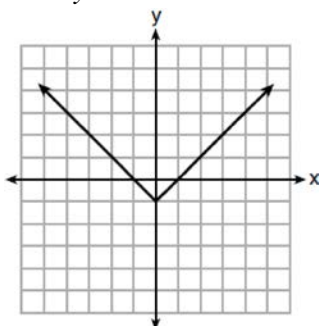
552 On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?

- 1) 65
- 2) 67
- 3) 69
- 4) 71

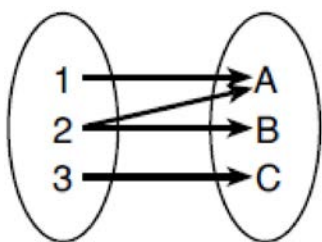
553 Which relation is *not* a function?

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

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



3)



4)

554 The formula for the volume of a cone is

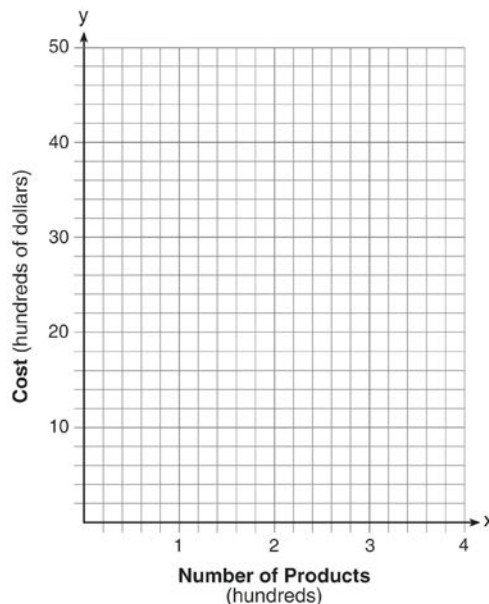
$$V = \frac{1}{3} \pi r^2 h.$$

Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .

555 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

556 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.

Algebra I Regents Exam Questions at Random

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- 557 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)  $(1, 3)$
- 558 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)  $x \geq 11$
- 559 Which expression is equivalent to  $(-4x^2)^3$ ?
- 1)  $-12x^6$
  - 2)  $-12x^5$
  - 3)  $-64x^6$
  - 4)  $-64x^5$
- 560 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.
- 561 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  $3$
- 562 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*.
- 563 Solve for  $x$  to the *nearest tenth*:  $x^2 + x - 5 = 0$ .
- 564 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%
- 565 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.

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

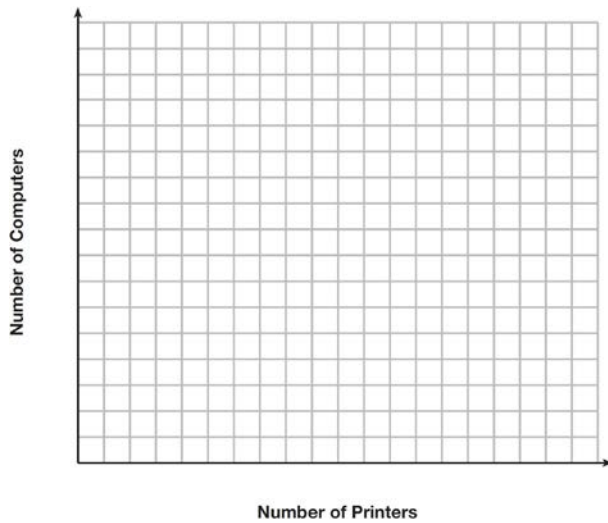
Four statements about this system are written below.

- 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?

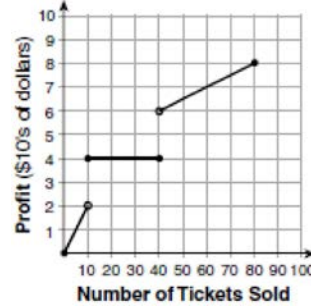
- 1) II, only
- 2) IV, only
- 3) I and IV
- 4) II and III

567 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.

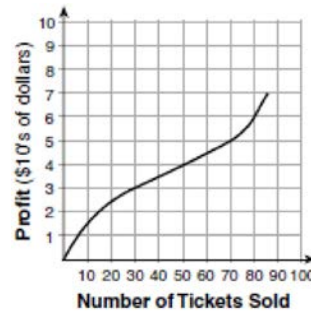


Determine a combination of printers and computers that would allow the electronics store to meet all of the constraints. Explain how you obtained your answer.

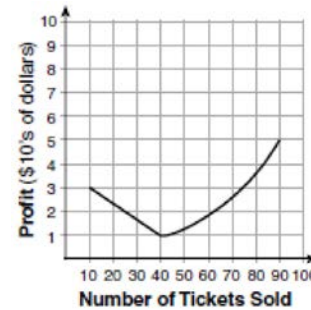
568 To keep track of his profits, the owner of a carnival booth decided to model his ticket sales on a graph. He found that his profits only declined when he sold between 10 and 40 tickets. Which graph could represent his profits?



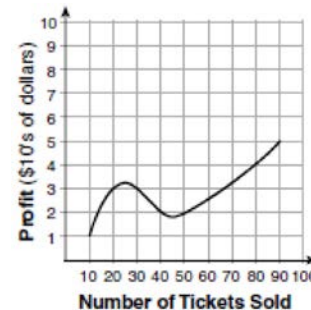
1)



2)



3)



4)



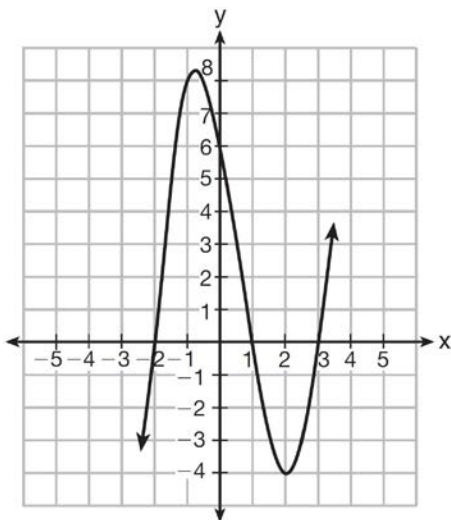
569 A landscaper is creating a rectangular flower bed such that the width is half of the length. The area of the flower bed is 34 square feet. Write and solve an equation to determine the width of the flower bed, to the *nearest tenth of a foot*.

570 Which equation(s) represent the graph below?

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

II  $y = (x - 3)(x^2 + x - 2)$

III  $y = (x - 1)(x^2 - 5x - 6)$



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

571 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  $x = 3$ .

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

573 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)  $9x^2 - 6x + 1 = 5$

574 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.

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



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

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

577 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.

578 Given the function  $f(n)$  defined by the following:

$$f(1) = 2$$

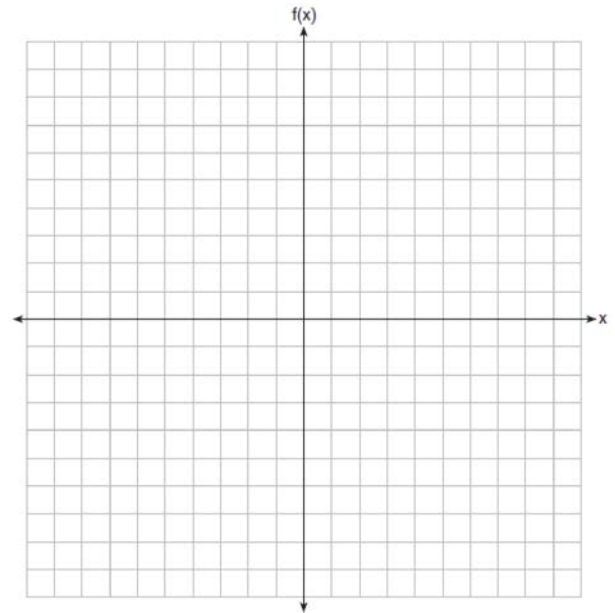
$$f(n) = -5f(n - 1) + 2$$

Which set could represent the range of the function?

- 1)  $\{2, 4, 6, 8, \dots\}$
- 2)  $\{2, -8, 42, -208, \dots\}$
- 3)  $\{-8, -42, -208, 1042, \dots\}$
- 4)  $\{-10, 50, -250, 1250, \dots\}$

579 Graph the following piecewise function on the set of axes below.

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



580 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

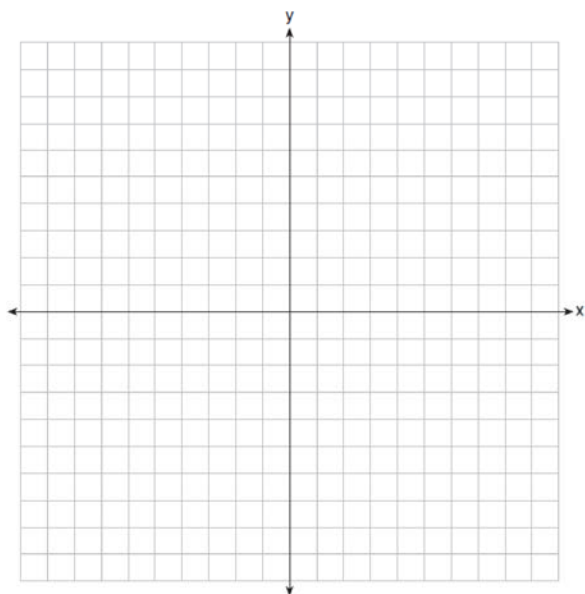
581 Dan took 12.5 seconds to run the 100-meter dash. He calculated the time to be approximately

- 1) 0.2083 minute
- 2) 750 minutes
- 3) 0.2083 hour
- 4) 0.52083 hour

582 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

583 On the set of axes below, draw the graph of the equation  $y = -\frac{3}{4}x + 3$ .

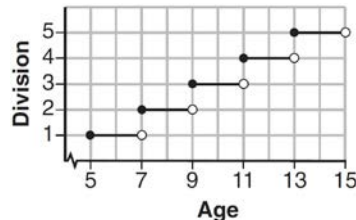


Is the point (3,2) a solution to the equation?  
Explain your answer based on the graph drawn.

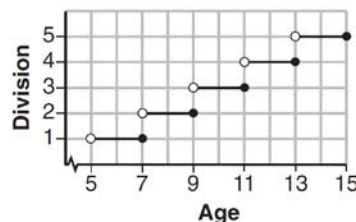
584 When solving  $p^2 + 5 = 8p - 7$ , Kate wrote  $p^2 + 12 = 8p$ . The property she used is

- 1) the associative property
- 2) the commutative property
- 3) the distributive property
- 4) the addition property of equality

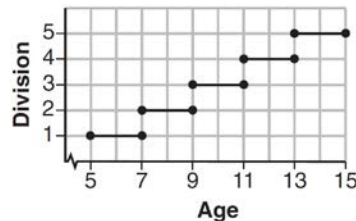
585 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?



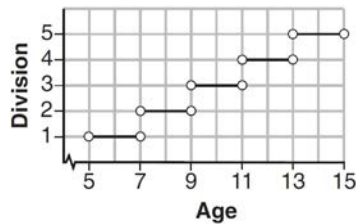
1)



2)



3)



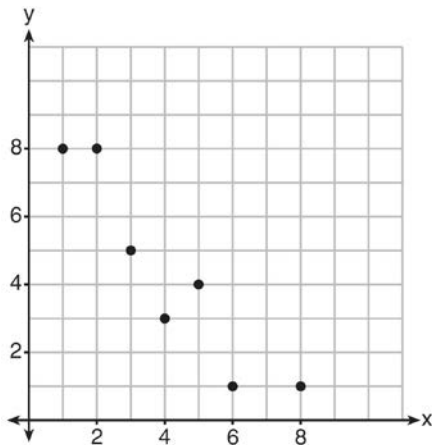
4)

586 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)

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

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



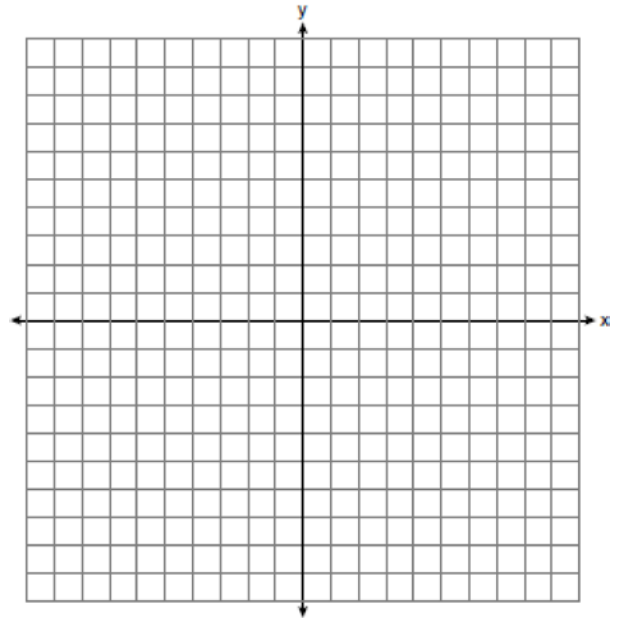
- 1) 1.00
- 2) 0.93
- 3) -0.93
- 4) -1.00

589 What are the solutions to the equation  $x^2 - 8x = 24$ ?

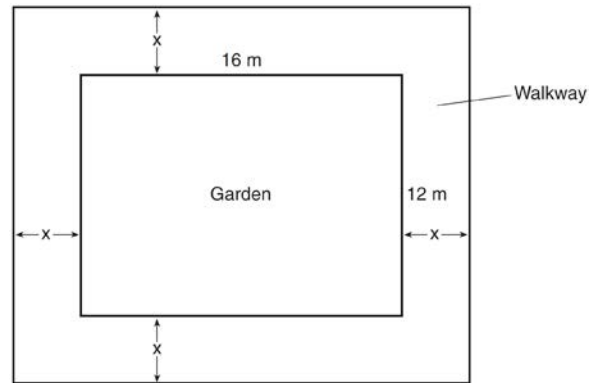
- 1)  $x = 4 \pm 2\sqrt{10}$
- 2)  $x = -4 \pm 2\sqrt{10}$
- 3)  $x = 4 \pm 2\sqrt{2}$
- 4)  $x = -4 \pm 2\sqrt{2}$

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

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



592 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.

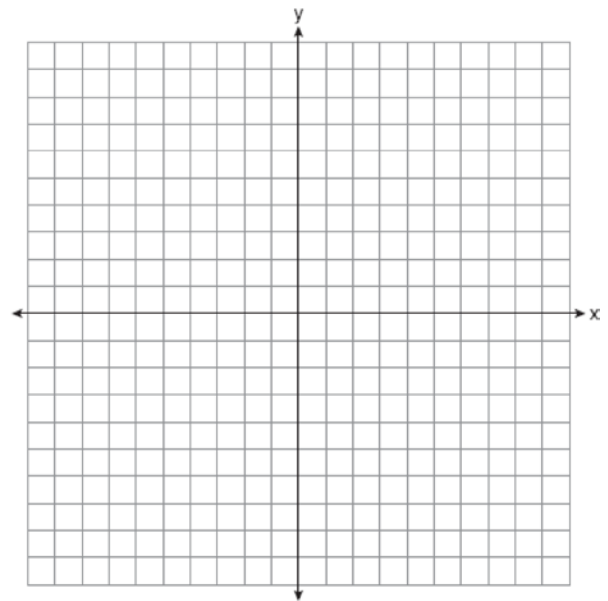
593 Hannah went to the school store to buy supplies and spent \$16. She bought four more pencils than pens and two fewer erasers than pens. Pens cost \$1.25 each, pencils cost \$0.55 each, and erasers cost \$0.75 each. If  $x$  represents the number of pens Hannah bought, write an equation in terms of  $x$  that can be used to find how many of each item she bought. Use your equation to determine algebraically how many pens Hannah bought.

594 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.

595 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)  $r = \frac{p_1 - p_2}{F}$

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



597 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.

598 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

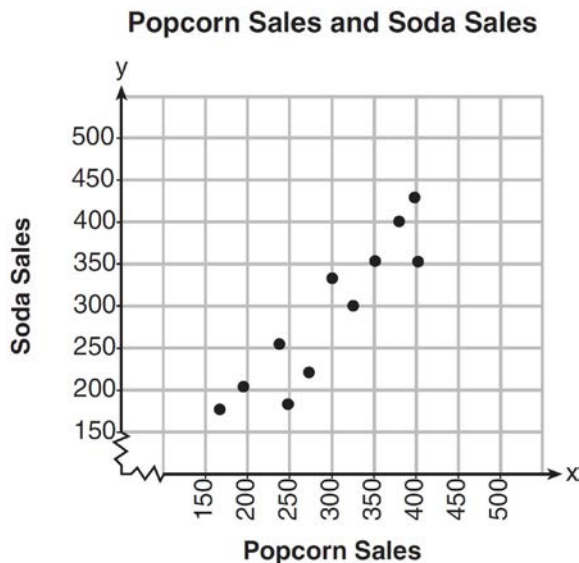
599 Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

	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%

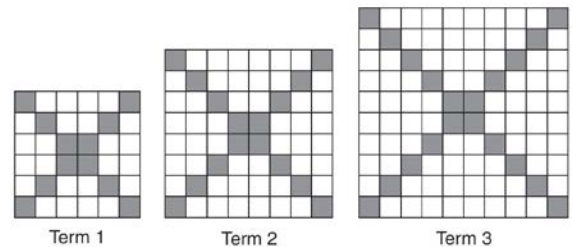
600 The scatterplot below compares the number of bags of popcorn and the number of sodas sold at each performance of the circus over one week.



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.

601 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?

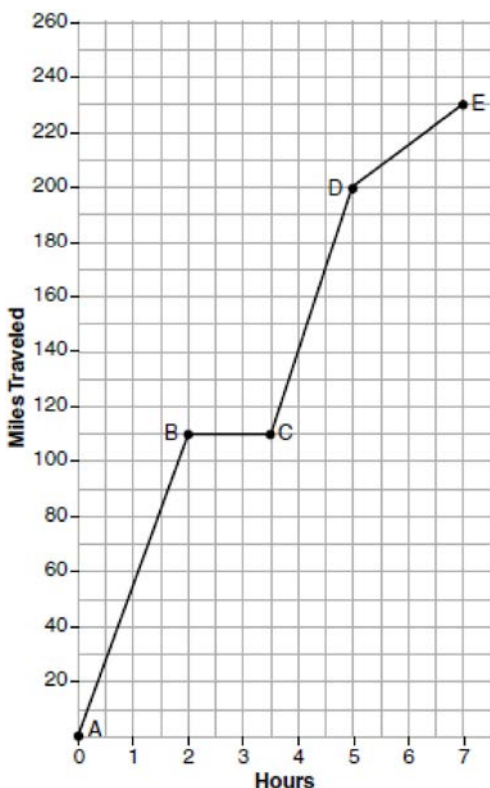
- 1)  $a_n = 4n + 12$
- 2)  $a_n = 4n + 8$
- 3)  $a_n = 4n + 4$
- 4)  $a_n = 4n + 2$

602 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

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

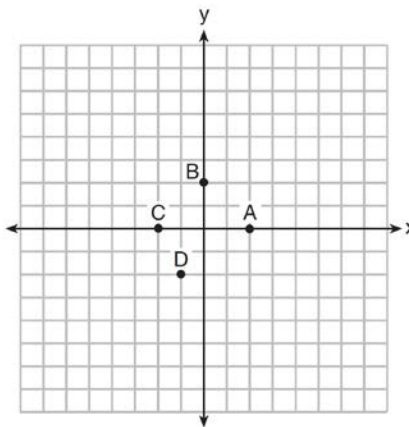
- 604 The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving.



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.

- 605 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?

- 606 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)  $D$

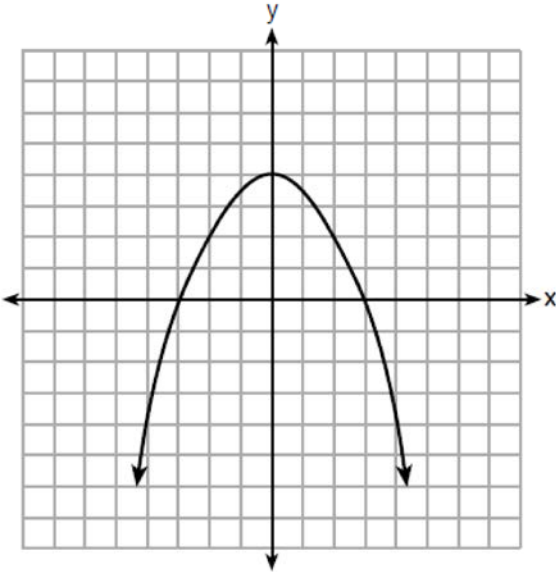
- 607 What is the solution to the system of equations below?

$$y = 2x + 8$$

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

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

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



- 609 The expression  $3(x+4) - (2x+7)$  is equivalent to
- 1)  $x+5$
  - 2)  $x-10$
  - 3)  $x-3$
  - 4)  $x+11$
- 610 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.
- 611 Factor  $x^4 - 16$  completely.
- 612 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)  $(2.5, 23.25)$
- 613 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)  $d$
- 614 Natasha is planning a school celebration and wants to have live music and food for everyone who attends. She has found a band that will charge her \$750 and a caterer who will provide snacks and drinks for \$2.25 per person. If her goal is to keep the average cost per person between \$2.75 and \$3.25, how many people,  $p$ , must attend?
- 1)  $225 < p < 325$
  - 2)  $325 < p < 750$
  - 3)  $500 < p < 1000$
  - 4)  $750 < p < 1500$
- 615 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







625 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.

626 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

627 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)  $(8x^2 + 32)(8x^2 - 32)$

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

629 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?

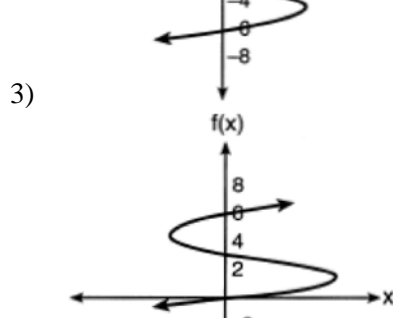
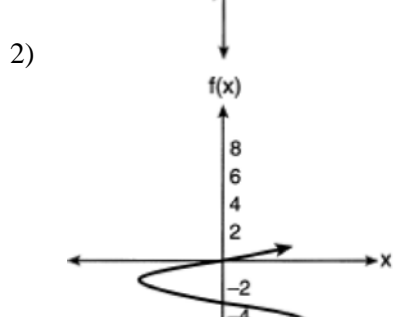
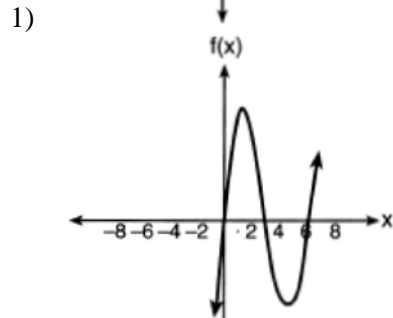
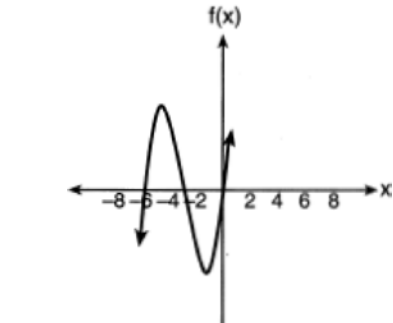
- 1) I and II, only  
 2) II and III, only  
 3) I and III, only  
 4) I, II, and III

630 What are the zeros of the function

$$f(x) = x^2 - 13x - 30?$$

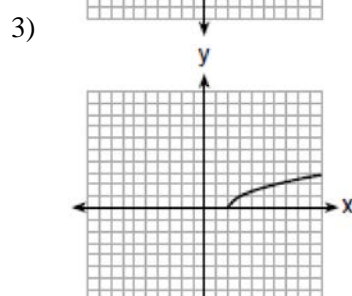
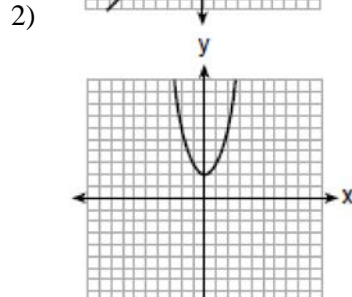
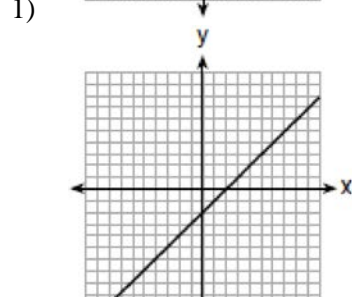
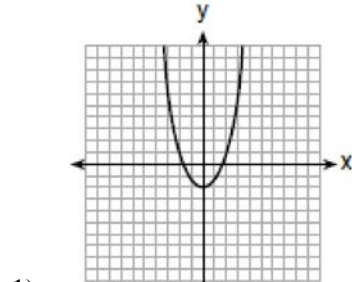
- 1) -10 and 3  
 2) 10 and -3  
 3) -15 and 2  
 4) 15 and -2

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



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

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

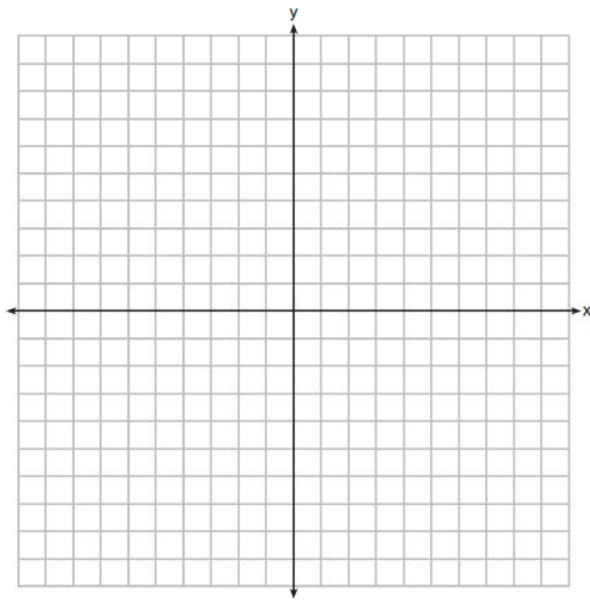


634 On the set of axes below, graph

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

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.

- 635 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

- 636 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.

- 637 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)

- 638 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)  $-2 \pm 4\sqrt{5}$

- 639 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  $\geq 0$

- 640 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.

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

641 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)  $2lh$

642 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.

643 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)  $4$

644 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.

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

646 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.

647 Which quadratic function has the largest maximum?

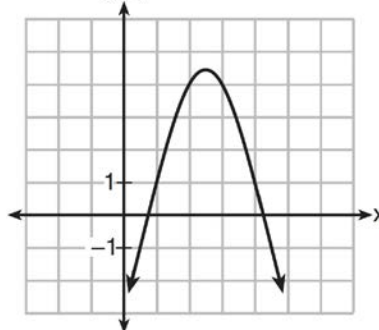
1)  $h(x) = (3 - x)(2 + x)$

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

2)

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

$g(x)$



4)

648 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)  $(4x - 9)(x + 3)$



656 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.

657 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  $d$ ?

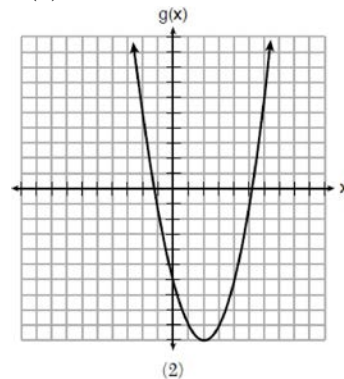
- 1)  $t = \sqrt{\frac{da}{2}}$
- 2)  $t = \sqrt{\frac{2d}{a}}$
- 3)  $t = \left(\frac{da}{d}\right)^2$
- 4)  $t = \left(\frac{2d}{a}\right)^2$

658 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.

659 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)

660 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)  $0 \leq h(t) \leq 9$

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

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





671 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

672 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?

673 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.

674 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)  $6x - 15 + 2x^2 - 5x$

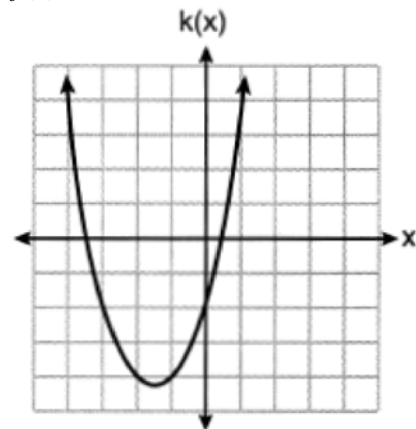
675 Which function has the *smallest* y-intercept?

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

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

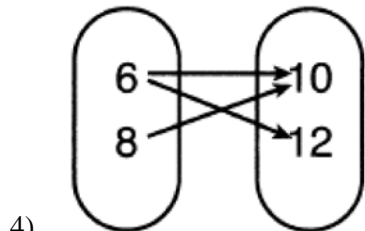
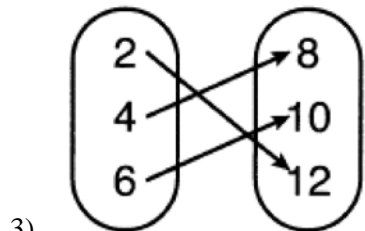
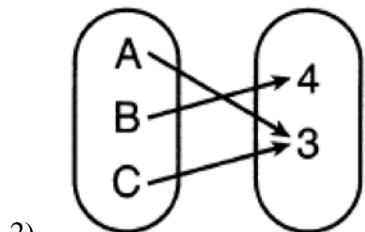
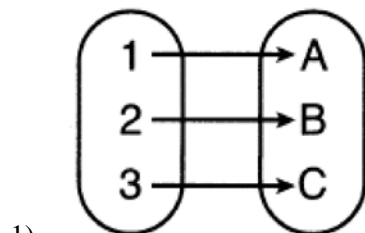
2)

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



4)

676 Which relation is *not* a function?



677 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

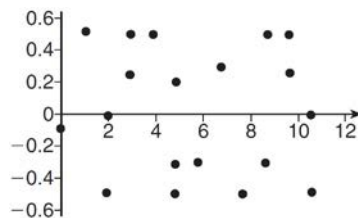
678 Solve algebraically for  $x$ :

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

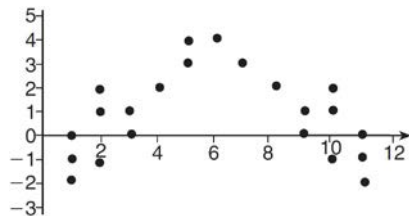
679 When  $3a + 7b > 2a - 8b$  is solved for  $a$ , the result is

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

680 The residual plots from two different sets of bivariate data are graphed below.



Graph A



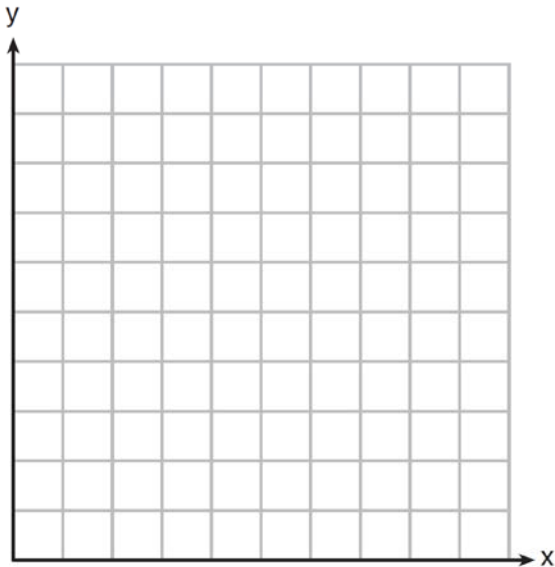
Graph B

Explain, using evidence from graph A and graph B, which graph indicates that the model for the data is a good fit.

681 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

- 682 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.

- 683 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  $r(x)$ .

- 684 State whether  $7 - \sqrt{2}$  is rational or irrational. Explain your answer.

- 685 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)  $y \div x$

- 686 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.

- 687 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)  $x + y = 14$   
 $2x + 6y = 20$

Algebra I Regents Exam Questions at Random

[www.jmap.org](http://www.jmap.org)

688 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

689 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

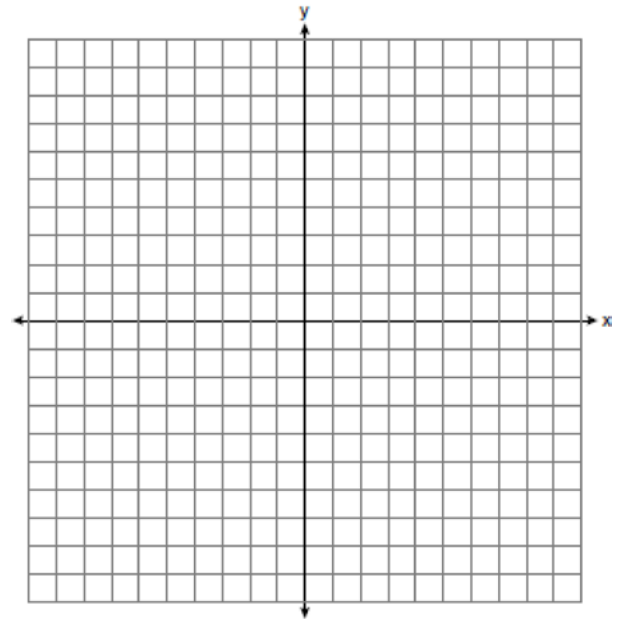
690 If  $k(x) = 2x^2 - 3\sqrt{x}$ , then  $k(9)$  is

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

691 Which expression results in a rational number?

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

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



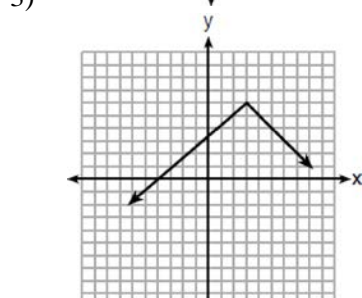
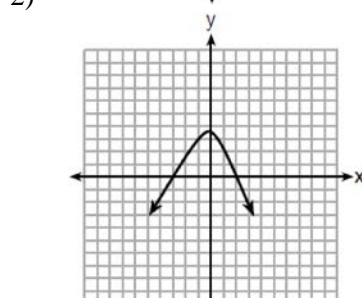
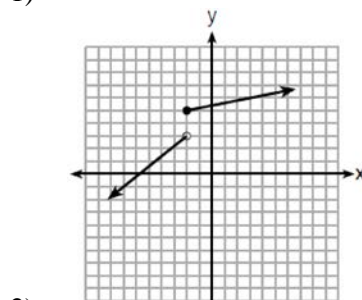
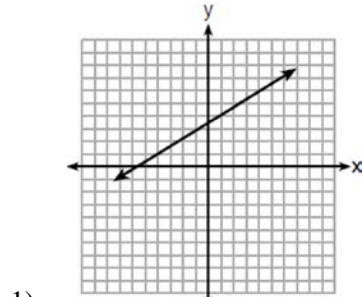
693 Which value would be a solution for  $x$  in the inequality  $47 - 4x < 7$ ?

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





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

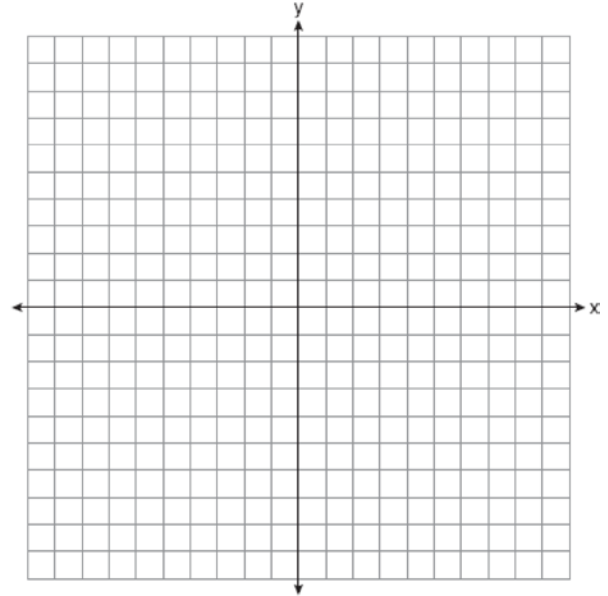


703 If  $f(x) = x^2$  and  $g(x) = x$ , determine the value(s) of  $x$  that satisfy the equation  $f(x) = g(x)$ .

704 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.

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

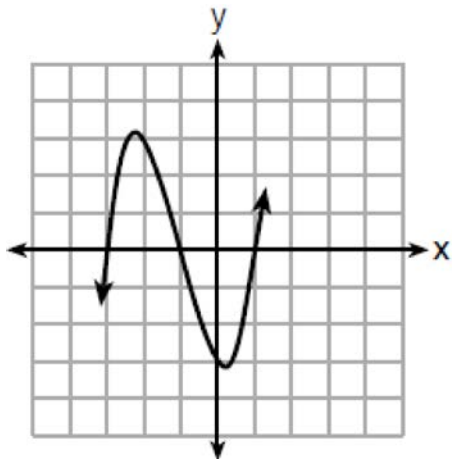
- I. 10 miles
- II. 44,880 feet
- III. 15,560 yards

Which run(s) are at least 15 kilometers?

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



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



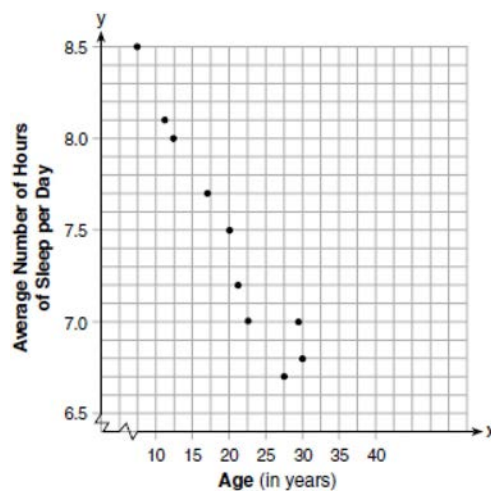
Which function could represent this graph?

- 1)  $f(x) = (x - 3)(x - 1)(x + 1)$
  - 2)  $g(x) = (x + 3)(x + 1)(x - 1)$
  - 3)  $h(x) = (x - 3)(x - 1)(x + 3)$
  - 4)  $k(x) = (x + 3)(x + 1)(x - 3)$
- 707 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
- 708 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)  $9$

- 709 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)  $1.75x + 1.60y \geq 10$

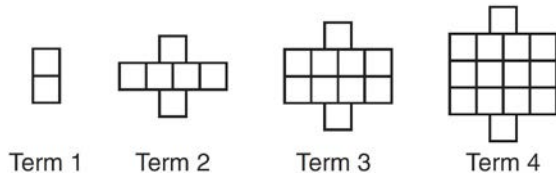
- 710 A student plotted the data from a sleep study as shown in the graph below.



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.

711 A pattern of blocks is shown below.



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

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

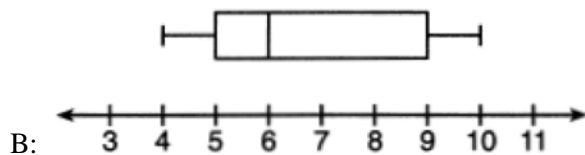
- 1) I and II  
 2) I and III  
 3) II and III  
 4) III, only

712 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.

714 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.

713 Below are two representations of data.

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



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  $B$

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

716 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)  $-4 \pm \sqrt{26}$

717 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)  $(4w - 1)(w + 3)$

718 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.

719 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.

720 The formula for the volume of a cone is

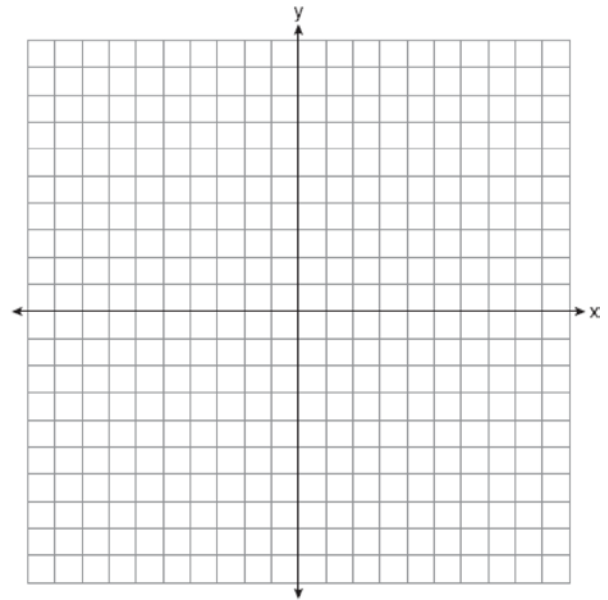
$V = \frac{1}{3} \pi r^2 h$ . The radius,  $r$ , of the cone may be expressed as

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

721 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.

- 722 An application developer released a new app to be downloaded. The table below gives the number of downloads for the first four weeks after the launch of the app.

<b>Number of Weeks</b>	1	2	3	4
<b>Number of Downloads</b>	120	180	270	405

Write an exponential equation that models these data. Use this model to predict how many downloads the developer would expect in the 26th week if this trend continues. Round your answer to the nearest download. Would it be reasonable to use this model to predict the number of downloads past one year? Explain your reasoning.

- 723 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)  $a + c = 1470$   
 $7.75a + 10.25c = 150$
- 724 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
- 725 If the parent function of  $f(x)$  is  $p(x) = x^2$ , then the graph of the function  $f(x) = (x - k)^2 + 5$ , where  $k > 0$ , would be a shift of
- 1)  $k$  units to the left and a move of 5 units up
  - 2)  $k$  units to the left and a move of 5 units down
  - 3)  $k$  units to the right and a move of 5 units up
  - 4)  $k$  units to the right and a move of 5 units down
- 726 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

## Algebra I Regents at Random Answer Section

1 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

2 ANS:

$$y = 0.05x - 0.92$$

PTS: 2

REF: fall1307ai

NAT: S.ID.B.6

TOP: Regression

KEY: linear

3 ANS: 1

PTS: 2

REF: 081706ai

NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

4 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

5 ANS: 4

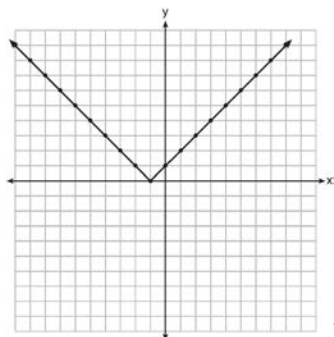
PTS: 2

REF: 081421ai

NAT: S.ID.B.6

TOP: Regression KEY: linear

6 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

7 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

8 ANS: 3

PTS: 2

REF: 081412ai

NAT: F.LE.A.1

TOP: Families of Functions

9 ANS: 2

PTS: 2

REF: 081806ai

NAT: F.IF.A.2

TOP: Domain and Range

KEY: limited domain

10 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

11 ANS: 1 PTS: 2 REF: 081710ai NAT: F.IF.A.2  
TOP: Domain and Range KEY: limited domain

12 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

13 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

14 ANS: 3 PTS: 2 REF: 081602ai NAT: A.REI.D.10  
TOP: Identifying Solutions

15 ANS: 2 PTS: 2 REF: 081801ai NAT: A.SSE.B.3  
TOP: Modeling Exponential Functions

16 ANS:

$$w(w+40)=6000$$

$$w^2+40w-6000=0$$

$$(w+100)(w-60)=0$$

$$w=60, l=100$$

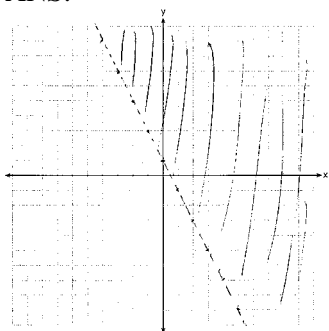
PTS: 4 REF: 081436ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

17 ANS: 1

$$A: \bar{x}=6; \sigma_x=3.16 \quad B: \bar{x}=6.875; \sigma_x=3.06$$

PTS: 2 REF: 081519ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion

18 ANS:



PTS: 2 REF: 081526ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

19 ANS: 4 PTS: 2 REF: 081419ai NAT: A.CED.A.3

TOP: Modeling Linear Systems

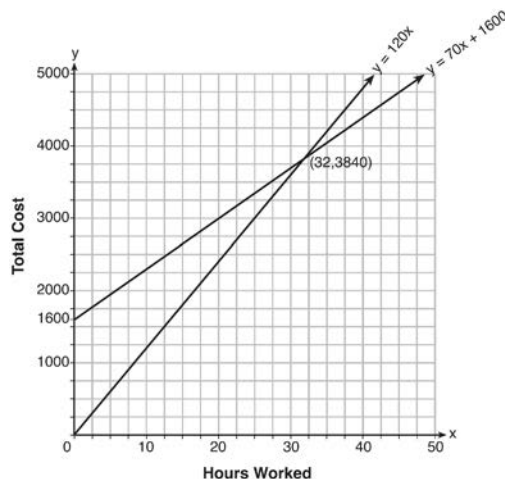
20 ANS:

$$5x + 4x^2(2x + 7) - 6x^2 - 9x = -4x + 8x^3 + 28x^2 - 6x^2 = 8x^3 + 22x^2 - 4x$$

PTS: 2 REF: 081731ai NAT: A.APR.A.1 TOP: Operations with Polynomials

KEY: multiplication

21 ANS:



$$y = 120x \text{ and } y = 70x + 1600$$

$$120x = 70x + 1600$$

$$50x = 1600$$

$$x = 32$$

$$y = 120(35) = 4200 \quad \text{Green Thumb is less expensive.}$$

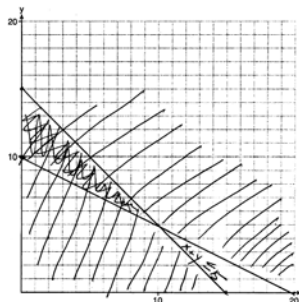
$$y = 70(35) + 1600 = 4050$$

PTS: 6 REF: fall1315ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

22 ANS: 2 PTS: 2 REF: 081816ai NAT: A.APR.B.3

TOP: Zeros of Polynomials

23 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

24 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

25 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

26 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

27 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



28 ANS: 2  
 $r = 0.92$

PTS: 2 REF: 081606ai NAT: S.ID.C.8 TOP: Correlation Coefficient

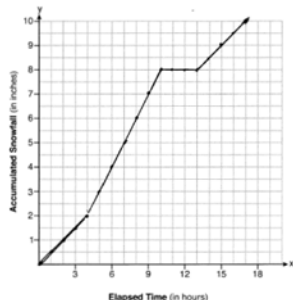
29 ANS:

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

30 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

31 ANS:

$$185 + 0.03x = 275 + 0.025x$$

$$0.005x = 90$$

$$x = 18000$$

PTS: 2 REF: 081427ai NAT: A.REI.C.6 TOP: Solving Linear Systems

KEY: substitution

32 ANS: 2

PTS: 2

REF: 081416ai

NAT: F.LE.A.2

TOP: Sequences KEY: explicit

33 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

34 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

- 35 ANS: 4                   PTS: 2                   REF: 081709ai           NAT: F.LE.B.5  
TOP: Modeling Linear Functions
- 36 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
- 37 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
- 38 ANS: 4                   PTS: 2                   REF: 081405ai           NAT: A.REI.D.10  
TOP: Identifying Solutions
- 39 ANS: 1  
 $a_2 = 3 + 2(6)^2 = 75$
- PTS: 2                   REF: 081919ai           NAT: F.IF.A.3           TOP: Sequences  
KEY: recursive
- 40 ANS: 1                   PTS: 2                   REF: 081515ai           NAT: F.IF.B.6  
TOP: Rate of Change
- 41 ANS: 3                   PTS: 2                   REF: 081703ai           NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares           KEY: quadratic
- 42 ANS:  
 $B = 3000(1.042)^t$
- PTS: 2                   REF: 081426ai           NAT: F.BF.A.1           TOP: Modeling Exponential Functions
- 43 ANS: 3                   PTS: 2                   REF: 081410ai           NAT: F.LE.A.1  
TOP: Families of Functions           KEY: bimodalgraph
- 44 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
- 45 ANS: 1  
 $4x - 5(0) = 40$   
 $4x = 40$   
 $x = 10$
- PTS: 2                   REF: 081408ai           NAT: F.IF.B.4           TOP: Graphing Linear Functions

46 ANS: 1 PTS: 2 REF: 081707ai NAT: A.APR.B.3  
TOP: Graphing Polynomial Functions

47 ANS: 3 PTS: 2 REF: 081807ai NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares KEY: quadratic

48 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

49 ANS: 4 PTS: 2 REF: 081603ai NAT: S.ID.A.1  
TOP: Box Plots KEY: interpret

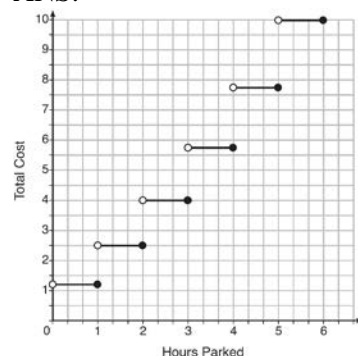
50 ANS: 2

$$w(w + 7) = w^2 + 7w$$

PTS: 2 REF: 081920ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

51 ANS: 3 PTS: 2 REF: 081409ai NAT: A.CED.A.1  
TOP: Modeling Quadratics

52 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

53 ANS:

$$h(n) = 1.5(n - 1) + 3$$

PTS: 2 REF: 081525ai NAT: F.LE.A.2 TOP: Modeling Linear Functions

54 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

55 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.C.9

TOP: Comparing Functions

56 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

57 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

58 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

59 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

60 ANS: 4

PTS: 2

REF: 081508ai

NAT: A.CED.A.2

TOP: Modeling Linear Equations

61 ANS: 1

PTS: 2

REF: 081623ai

NAT: A.APR.B.3

TOP: Graphing Polynomial Functions

62 ANS: 3                   PTS: 2                   REF: 081808ai           NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions

63 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

64 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

65 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

66 ANS:

$$\frac{2}{40} = \frac{5.75}{x} \quad \frac{5280}{115} \approx 46$$

$$x = 115$$

PTS: 2                   REF: 081730ai           NAT: N.Q.A.2           TOP: Using Rate

67 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

68 ANS: 3                   PTS: 2                   REF: 081914ai           NAT: A.REI.D.11  
TOP: Other Systems

69 ANS: 4                   PTS: 2                   REF: 081723ai           NAT: A.CED.A.1  
TOP: Modeling Quadratics

70 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

71 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

72 ANS: 4

$$36x + 30y = 96$$

PTS: 2 REF: 081724ai NAT: A.REI.C.6 TOP: Solving Linear Systems

73 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 Functions

74 ANS: 1

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

PTS: 2 REF: 081504ai NAT: A.APR.B.3 TOP: Graphing Polynomial Functions

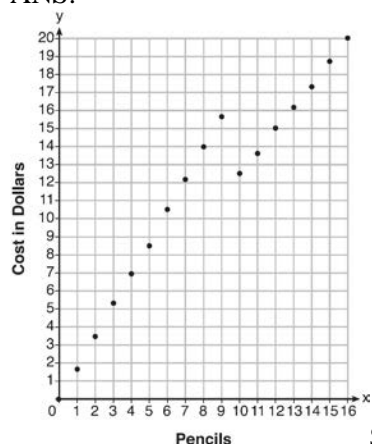
75 ANS:

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 Functions

76 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

77 ANS: 4

$$f(1) = 3; f(2) = -5; f(3) = 11; f(4) = -21; f(5) = 43$$

PTS: 2 REF: 081424ai NAT: F.IF.A.3 TOP: Sequences

KEY: recursive

78 ANS: 3 PTS: 2 REF: 081908ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

79 ANS: 2 PTS: 2 REF: 081907ai NAT: F.LE.A.1

TOP: Families of Functions

80 ANS: 2 PTS: 2 REF: 081624ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

81 ANS:

-3, 1

PTS: 2 REF: 081630ai NAT: A.REI.D.11 TOP: Other Systems

82 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

83 ANS: 2 PTS: 2 REF: 081712ai NAT: A.SSE.A.1

TOP: Modeling Expressions

84 ANS: 1 PTS: 2 REF: 081918ai NAT: F.IF.B.4

TOP: Relating Graphs to Events

85 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

86 ANS: 4

$$1) \frac{g(1) - g(-1)}{1 - (-1)} = \frac{4 - 6}{2} = \frac{-2}{2} = -1 \quad 2) g(0) = 6 \quad 3) x = \frac{-(-1)}{2(-1)} = -\frac{1}{2}; \quad g\left(-\frac{1}{2}\right) = -\left(-\frac{1}{2}\right)^2 + \frac{1}{2} + 6 = 6\frac{1}{4}$$

$$\frac{n(1) - n(-1)}{1 - (-1)} = \frac{9 - 5}{2} = \frac{4}{2} = 2 \quad n(0) = 8 \quad x = 1; n(1) = 9$$

$$4) g: S = \frac{-(-1)}{-1} = -1$$

$$n: S = -2 + 4 = 2$$

PTS: 2 REF: 081521ai NAT: F.IF.C.9 TOP: Comparing Functions

87 ANS: 1

TOP: Operations with Radicals

PTS: 2

REF: 081401ai

KEY: classify

NAT: N.RN.B.3

88 ANS: 4

TOP: Using Rate

PTS: 2

REF: 081909ai

NAT: N.Q.A.2

89 ANS: 3

TOP: Factoring Polynomials

PTS: 2

REF: 081803ai

KEY: quadratic

NAT: A.SSE.A.2

90 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

91 ANS: 4

TOP: Identifying Properties

PTS: 2

REF: 081701ai

NAT: A.REI.A.1

92 ANS: 2

$$f(-2) = (-2 - 1)^2 + 3(-2) = 9 - 6 = 3$$

PTS: 2 REF: 081605ai NAT: F.IF.A.2 TOP: Functional Notation

93 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

94 ANS: 3

TOP: Modeling Expressions

PTS: 2

REF: 081901ai

NAT: A.SSE.A.1



95 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

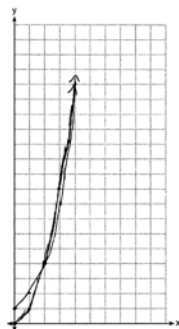
96 ANS: 3 PTS: 2 REF: 081403ai NAT: A.REI.B.4

TOP: Solving Quadratics KEY: taking square roots

97 ANS: 3 PTS: 2 REF: 081616ai NAT: A.CED.A.1

TOP: Modeling Linear Equations

98 ANS:



$g(x)$  has a greater value:  $2^{20} > 20^2$

PTS: 4 REF: 081533ai NAT: F.LE.A.3 TOP: Families of Functions

99 ANS: 2 PTS: 2 REF: 081516ai NAT: F.IF.C.7

TOP: Graphing Piecewise-Defined Functions KEY: bimodalgraph

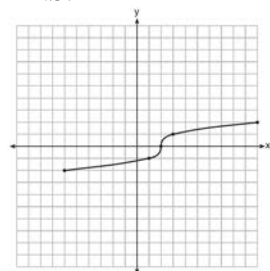
100 ANS:

$$\frac{2}{3} < \frac{x}{5}$$

$$\frac{10}{3} < x$$

PTS: 2 REF: 081929ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

101 ANS:



PTS: 2 REF: fall1304ai NAT: F.IF.C.7 TOP: Graphing Root Functions

102 ANS: 1

$$2h + 8 > 3h - 6$$

$$14 > h$$

$$h < 14$$

PTS: 2 REF: 081607ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

103 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: context

104 ANS: 1

$$f(2) = 0$$

$$f(6) = 8$$

PTS: 2 REF: 081411ai NAT: F.IF.A.2 TOP: Domain and Range  
KEY: limited domain

105 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

106 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.APR.B.3 TOP: Zeros of Polynomials

107 ANS:

$$18j + 32w = 19.92 \quad 14(.52) + 26(.33) = 15.86 \neq 15.76 \quad 7(18j + 32w = 19.92) \quad 18j + 32(.24) = 19.92$$

$$14j + 26w = 15.76$$

$$9(14j + 26w = 15.76) \quad 18j + 7.68 = 19.92$$

$$126j + 224w = 139.44 \quad 18j = 12.24$$

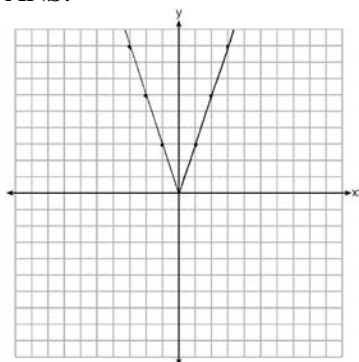
$$126j + 234w = 141.84 \quad j = .68$$

$$10w = 2.4$$

$$w = .24$$

PTS: 6 REF: 081637ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

108 ANS:



2 down. 4 right.

PTS: 4 REF: 081433ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

109 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

110 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

111 ANS: 1 PTS: 2 REF: 081407ai NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities KEY: solution set

112 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

113 ANS: 2 PTS: 2 REF: 081817ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

114 ANS: 4 PTS: 2 REF: spr1304ai NAT: A.CED.A.1

TOP: Geometric Applications of Quadratics

115 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

116 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

117 ANS:

0, -1, 1, 1, 1

PTS: 2 REF: 081832ai NAT: F.IF.A.3 TOP: Sequences

KEY: recursive

118 ANS:

Graph  $f(x)$  and find  $x$ -intercepts, -3, 1, 8.

PTS: 2 REF: 081825ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

119 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

120 ANS: 1

PTS: 2

REF: 081722ai

NAT: S.ID.C.8

TOP: Correlation Coefficient

121 ANS: 1

PTS: 2

REF: 081618ai

NAT: F.LE.A.3

TOP: Families of Functions

122 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

123 ANS: 3

PTS: 2

REF: 081812ai

NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

124 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

125 ANS: 3 PTS: 2 REF: 081821ai NAT: S.ID.C.9

TOP: Analysis of Data

126 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: context

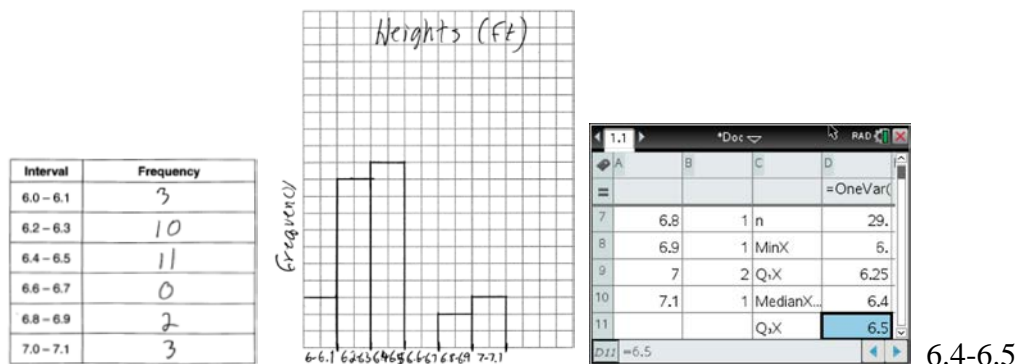
127 ANS: 3

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

$$2x - 2y = 6$$

PTS: 2 REF: 081822ai NAT: A.REI.C.6 TOP: Solving Linear Systems

128 ANS:



PTS: 4 REF: 081734ai NAT: S.ID.A.1 TOP: Frequency Histograms

KEY: frequency histograms

129 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

130 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

131 ANS:

$$y = 836.47(2.05)^x \text{ The data appear to grow at an exponential rate. } y = 836.47(2.05)^2 \approx 3515.$$

PTS: 4 REF: fall1313ai NAT: S.ID.B.6 TOP: Regression

KEY: choose model

132 ANS: 3 PTS: 2 REF: 081614ai NAT: A.CED.A.1

TOP: Modeling Linear Equations

133 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

134 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

135 ANS: 4 PTS: 2 REF: 081622ai NAT: A.REI.C.6

TOP: Solving Linear Systems

136 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

137 ANS: 1

PTS: 2

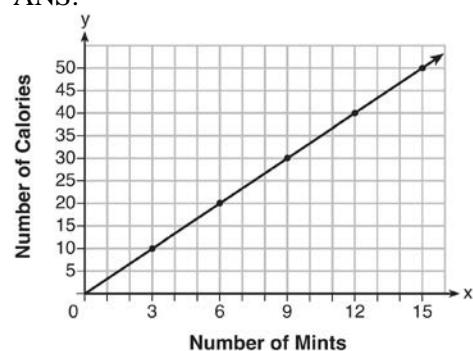
REF: 081514ai

NAT: F.LE.A.2

TOP: Sequences

KEY: recursive

138 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

139 ANS: 3

PTS: 2

REF: 081609ai

NAT: N.Q.A.2

TOP: Using Rate

140 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

141 ANS: 4

PTS: 2

REF: 081503ai

NAT: A.SSE.A.1

TOP: Modeling Expressions

142 ANS: 2

PTS: 2

REF: 081620ai

NAT: F.IF.B.5

TOP: Domain and Range

143 ANS: 4

Time is continuous and positive.

PTS: 2

REF: 081921ai

NAT: F.IF.B.5

TOP: Domain and Range

- 144 ANS:  
 $at = v_f - v_i$   
 $at + v_i = v_f$
- PTS: 2 REF: 081928ai NAT: A.CED.A.4 TOP: Transforming Formulas
- 145 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
- 146 ANS:  
 $V(t) = 25000(0.815)^t$   $V(3) - V(4) \approx 2503.71$
- PTS: 4 REF: 081834ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions
- 147 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
- 148 ANS: 2 PTS: 2 REF: 081714ai NAT: F.LE.A.2  
TOP: Families of Functions
- 149 ANS: 1  
 $-5 - 2 = -7$
- PTS: 2 REF: 081905ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions
- 150 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
- 151 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
- 152 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
- 153 ANS: 1 PTS: 2 REF: 081805ai NAT: F.IF.A.2  
TOP: Functional Notation



154 ANS: 3

$$2x^3 + 12x - 10x^2 = 0$$

$$2x(x^2 - 5x + 6) = 0$$

$$2x(x - 3)(x - 2) = 0$$

$$x = 0, 2, 3$$

PTS: 2 REF: 081719ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

155 ANS:

2 units right and 3 units down.

PTS: 2 REF: 081626ai NAT: F.BF.B.3 TOP: Transformations with Functions

156 ANS: 2 PTS: 2 REF: 081511ai NAT: F.IF.A.1

TOP: Defining Functions KEY: mixed

157 ANS: 2 PTS: 2 REF: 081810ai NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

158 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

159 ANS: 4

$$x = \frac{-(-2)}{2(2)} = \frac{1}{2} \quad h\left(\frac{1}{2}\right) = -\frac{9}{2}$$

PTS: 2 REF: 081923ai NAT: F.IF.A.2 TOP: Domain and Range

KEY: real domain, quadratic

160 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.C.9 TOP: Comparing Functions

161 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

162 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

163 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: context

164 ANS: 1

PTS: 2

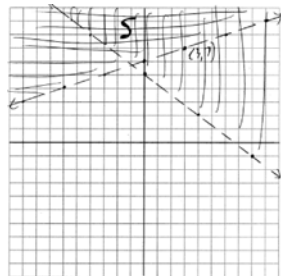
REF: 081415ai

NAT: A.SSE.A.2

TOP: Factoring Polynomials

KEY: higher power

165 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

166 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

167 ANS: 4

PTS: 2

REF: 081604ai

NAT: F.LE.A.2

TOP: Modeling Linear Functions

168 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

169 ANS:

$7x - 3(4x - 8) \leq 6x + 12 - 9x$  6, 7, 8 are the numbers greater than or equal to 6 in the interval.

$$7x - 12x + 24 \leq -3x + 12$$

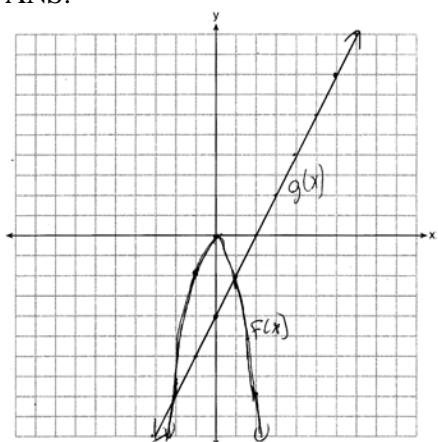
$$-5x + 24 \leq -3x + 12$$

$$12 \leq 2x$$

$$6 \leq x$$

PTS: 4 REF: 081534ai NAT: A.REI.B.3 TOP: Interpreting Solutions

170 ANS:



$$x = -2, 1$$

PTS: 4 REF: 081435ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

171 ANS: 2

$$(1.0005)^7 \approx 1.0035$$

PTS: 2 REF: 081913ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

172 ANS: 1

TOP: Sequences

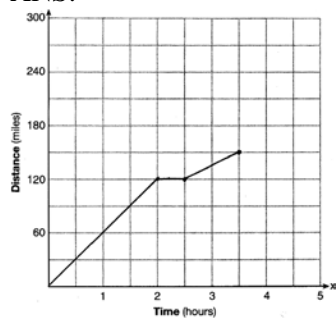
PTS: 2

KEY: explicit

REF: 081610ai

NAT: F.LE.A.2

173 ANS:



PTS: 2 REF: 081528ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

174 ANS: 1  
 $8 - 1 = 7$ PTS: 2 REF: 081915ai NAT: S.ID.A.1 TOP: Box Plots  
KEY: interpret

175 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 roots176 ANS: 3 PTS: 2 REF: 081506ai NAT: A.REI.D.12  
TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph177 ANS: 4 PTS: 2 REF: 081815ai NAT: F.IF.C.7  
TOP: Graphing Piecewise-Defined Functions178 ANS: 3 PTS: 2 REF: spr1302ai NAT: A.APR.B.3  
TOP: Zeros of Polynomials179 ANS:  
 $T(d) = 2d + 28$   $T(6) = 2(6) + 28 = 40$ 

PTS: 2 REF: 081532ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

180 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

181 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  
182 ANS: 4 PTS: 2 REF: 081505ai NAT: A.CED.A.1  
TOP: Modeling Linear Inequalities

183 ANS: 3                      PTS: 2                      REF: 081819ai                      NAT: A.REI.D.11  
TOP: Other Systems

184 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: context

185 ANS: 4                      PTS: 2                      REF: 081902ai                      NAT: F.IF.A.1  
TOP: Defining Functions                      KEY: ordered pairs

186 ANS: 1  
 $2(3x^3 + 2x^2 - 17)$

PTS: 2                      REF: 081813ai                      NAT: A.APR.A.1                      TOP: Operations with Polynomials  
KEY: addition

187 ANS: 1  
 $x - 4y = -10$     $x + 3 = 5$     $5x = 10$     $2 + y = 5$

$$\underline{x + y = 5} \quad x = 2 \quad x = 2 \quad y = 3$$

$$-5y = -15$$

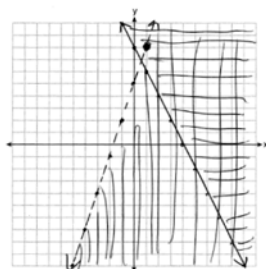
$$y = 3$$

PTS: 2                      REF: 081922ai                      NAT: A.REI.C.6                      TOP: Solving Linear Systems

188 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

189 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

190 ANS: 1                      PTS: 2                      REF: 081717ai                      NAT: F.LE.A.1  
TOP: Families of Functions

191 ANS: 3  
 $15 > 5$

PTS: 2                      REF: 081502ai                      NAT: A.REI.C.6                      TOP: Graphing Linear Systems

192 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

193 ANS: 4

It is linear.

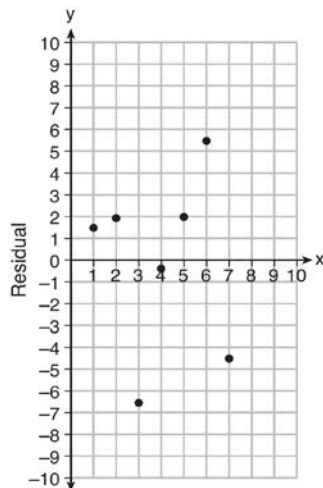
PTS: 2

REF: 081823ai

NAT: F.LE.A.1

TOP: Families of Functions

194 ANS:



$$y = 6.32x + 22.43$$

Based on the residual plot, the equation is a good fit for the data because the residual values are scattered without a pattern and are fairly evenly distributed above and below the  $x$ -axis.

PTS: 4

REF: fall1314ai

NAT: S.ID.B.6

TOP: Residuals

195 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

196 ANS: 3

PTS: 2

REF: 081523ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: taking square roots

197 ANS: 4

$$3x^2 - 3x - 6 = 0$$

$$3(x^2 - x - 2) = 0$$

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

$$x = 2, -1$$

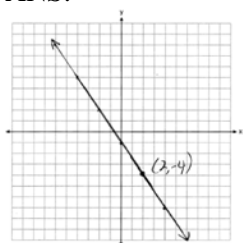
PTS: 2

REF: 081513ai

NAT: A.APR.B.3

TOP: Zeros of Polynomials

198 ANS:



PTS: 2 REF: 081927ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

199 ANS:

Commutative. This property is correct because  $x + y = y + x$ .

PTS: 2 REF: 081926ai NAT: A.REI.A.1 TOP: Identifying Properties

200 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

201 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

202 ANS: 3 PTS: 2 REF: 081507ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

203 ANS: 1 PTS: 2 REF: 081802ai NAT: F.LE.A.1

TOP: Families of Functions

204 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

205 ANS: 4 PTS: 2 REF: 081820ai NAT: F.LE.A.2

TOP: Sequences KEY: explicit

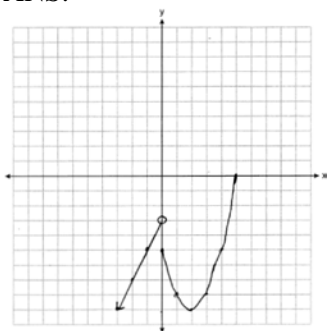
206 ANS:

$$9K = 5F + 2298.35$$

$$F = \frac{9K - 2298.35}{5}$$

PTS: 2 REF: 081829ai NAT: A.CED.A.4 TOP: Transforming Formulas

207 ANS:



PTS: 2 REF: 081932ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

208 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

209 ANS: 3 PTS: 2 REF: 081509ai NAT: A.SSE.A.2

TOP: Factoring Polynomials KEY: quadratic

210 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

211 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

212 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

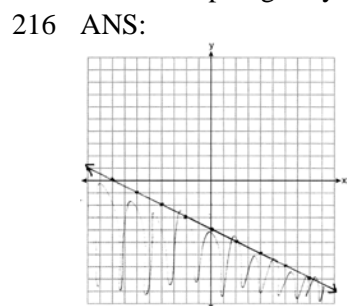


213 ANS: 3  
 $(2x + 3)(x + 4) = 2x^2 + 11x + 12$

PTS: 2 REF: 081916ai NAT: A.SSE.A.2 TOP: Factoring Polynomials  
 KEY: quadratic

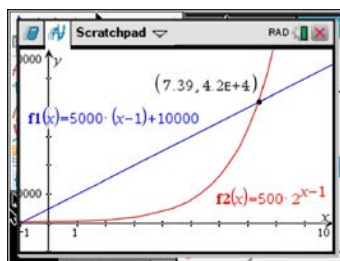
214 ANS: 2 PTS: 2 REF: 081809ai NAT: A.CED.A.3  
 TOP: Modeling Linear Systems

215 ANS: 2 PTS: 2 REF: 081501ai NAT: F.BF.B.3  
 TOP: Graphing Polynomial Functions



PTS: 4 REF: 081634ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities  
 217 ANS: 2 PTS: 2 REF: 081708ai NAT: S.ID.C.9  
 TOP: Analysis of Data

218 ANS: 3

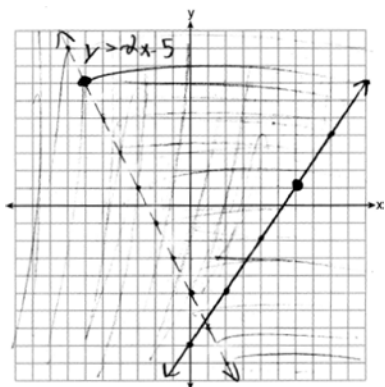


$x$	$A = 5000(x - 1) + 10000$	$B = 500(2)^{x-1}$
6	35,000	16,000
7	40,000	32,000
8	45,000	64,000
9	50,000	128,000

PTS: 2 REF: 081518ai NAT: F.LE.A.3 TOP: Families of Functions  
 219 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

220 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

221 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

222 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

223 ANS: 2

$$L + S = 20 \quad 27.98L + 10.98(20 - L) = 355.60$$

$$27.98L + 10.98S = 355.60 \quad 27.98L + 219.60 - 10.98L = 355.60$$

$$17L = 136$$

$$L = 8$$

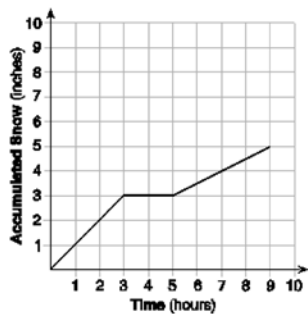
PTS: 2 REF: 081510ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

224 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

225 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

226 ANS: 3

A correlation coefficient close to  $-1$  or  $1$  indicates a good fit. For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the  $x$ -axis.

PTS: 2 REF: fall1303ai NAT: S.ID.B.6 TOP: Residuals

227 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

228 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

229 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

230 ANS: 1 PTS: 2 REF: 081417ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

231 ANS: 3

1, 3, 6, 10, 15, 21, 28, ...

PTS: 2 REF: 081715ai NAT: F.IF.A.3 TOP: Sequences

KEY: recursive

232 ANS: 3

$$m = \frac{3 - (-7)}{2 - 4} = -5 \quad 3 = (-5)(2) + b \quad y = -5x + 13 \text{ represents the line passing through the points } (2, 3) \text{ and } (4, -7). \text{ The}$$

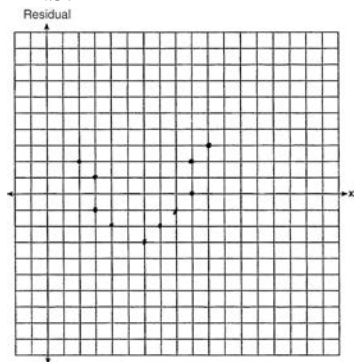
$$b = 13$$

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

233 ANS:



The line is a poor fit because the residuals form a pattern.

PTS: 2 REF: 081431ai NAT: S.ID.B.6 TOP: Residuals

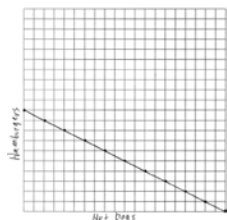
234 ANS:

$y = -7.76x + 246.34$ ,  $-0.88$  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

235 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

236 ANS:

$$b = 4s + 6 \quad 4s + 6 - 3 = 7s - 21 \quad b = 4(8) + 6 = 38 \quad 38 + x = 3(8 + x)$$

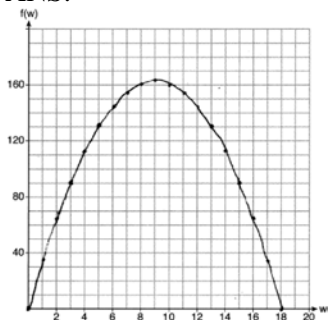
$$b - 3 = 7(s - 3) \quad 3s = 24 \quad x + 38 = 24 + 3x$$

$$s = 8 \quad 2x = 14$$

$$x = 7$$

PTS: 6 REF: 081837ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

237 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: context

238 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

239 ANS:

$$\frac{3.41 - 6.26}{9 - 3} = -0.475$$

PTS: 2 REF: 081827ai NAT: F.IF.B.6 TOP: Rate of Change

240 ANS: 1 PTS: 2 REF: 081617ai NAT: F.LE.A.2

TOP: Modeling Exponential Functions

241 ANS: 2 PTS: 2 REF: 081402ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

242 ANS: 1 PTS: 2 REF: 061401ai NAT: A.REI.A.1

TOP: Identifying Properties

243 ANS: 2 PTS: 2 REF: 061403ai NAT: A.APR.A.1

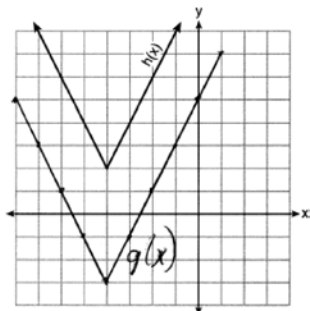
TOP: Operations with Polynomials KEY: subtraction

244 ANS: 4

There are no negative or fractional cars.

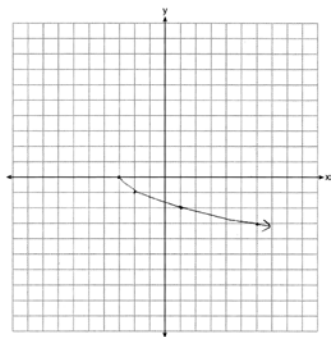
PTS: 2 REF: 061402ai NAT: F.IF.B.5 TOP: Domain and Range

245 ANS: 2



PTS: 2 REF: 081718ai NAT: F.IF.C.9 TOP: Comparing Functions

246 ANS:



PTS: 2

REF: 081625ai

NAT: F.IF.C.7

TOP: Graphing Root Functions

247 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

248 ANS: 1

PTS: 2

REF: 011504ai

NAT: F.BF.A.1

TOP: Modeling Exponential Functions

## Algebra I Regents at Random Answer Section

- 249 ANS: 1                      PTS: 2                      REF: 012018ai           NAT: F.IF.A.2  
TOP: Domain and Range                      KEY: real domain, absolute value
- 250 ANS: 1  
 $C(68) = \frac{5}{9}(68 - 32) = 20$
- PTS: 2                      REF: 011710ai           NAT: N.Q.A.1           TOP: Conversions  
KEY: formula
- 251 ANS: 2                      PTS: 2                      REF: 011713ai           NAT: S.ID.C.9  
TOP: Analysis of Data
- 252 ANS: 4                      PTS: 2                      REF: 011523ai           NAT: F.BF.A.1  
TOP: Modeling Linear Functions
- 253 ANS: 4                      PTS: 2                      REF: 011720ai           NAT: S.ID.A.2  
TOP: Central Tendency and Dispersion
- 254 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
- 255 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
- 256 ANS: 2                      PTS: 2                      REF: 061404ai           NAT: A.REI.D.12  
TOP: Graphing Systems of Linear Inequalities                      KEY: bimodalgraph | graph
- 257 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
- 258 ANS: 3                      PTS: 2                      REF: 011606ai           NAT: A.CED.A.4  
TOP: Transforming Formulas
- 259 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

260 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

261 ANS: 1 PTS: 2 REF: 012011ai NAT: A.REI.D.10

TOP: Identifying Solutions

262 ANS:

$$t = \frac{-b}{2a} = \frac{-64}{2(-16)} = \frac{-64}{-32} = 2 \text{ seconds. The height decreases after reaching its maximum at } t = 2 \text{ until it lands at}$$

$$t = 5 - 16t^2 + 64t + 80 = 0$$

$$t^2 - 4t - 5 = 0$$

$$(t - 5)(t + 1) = 0$$

$$t = 5$$

PTS: 4 REF: 011633ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: context

263 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

264 ANS: 1 PTS: 2 REF: 011906ai NAT: A.SSE.A.2

TOP: Factoring Polynomials KEY: quadratic

265 ANS: 2 PTS: 2 REF: 011605ai NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

266 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



267 ANS: 1

$$\frac{1}{2}x + 3 = |x| \quad -\frac{1}{2}x - 3 = x$$

$$\frac{1}{2}x + 3 = x \quad -x - 6 = 2x$$

$$x + 6 = 2x \quad -6 = 3x$$

$$x + 6 = 2x \quad -2 = x$$

$$6 = x$$

PTS: 2 REF: 011617ai NAT: A.REI.D.11 TOP: Other Systems

268 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

269 ANS: 2

$$1) x = \frac{-2}{2(-1)} = 1 \quad ; \quad 2) h = \frac{3}{2} \text{ Using } (0,3), 3 = a\left(0 - \frac{3}{2}\right)^2 + k; \text{ Using } (1,5), 5 = a\left(1 - \frac{3}{2}\right)^2 + k$$

$$y = -1^2 + 2(1) + 4 = 5$$

vertex (1,5)

$$3 = \frac{9}{4}a + k$$

$$5 = \frac{1}{4}a + k$$

$$k = 3 - \frac{9}{4}a$$

$$k = 5 - \frac{1}{4}a$$

$$5 - \frac{1}{4}a = 3 - \frac{9}{4}a \quad k = 5 - \frac{1}{4}(-1) = \frac{21}{4}; \quad 3) \text{ vertex } (5,5); \quad 4) \text{ Using } c = 1 \quad -9 = (-2)^2a + (-2)b + 1$$

$$20 - a = 12 - 9a \quad \text{vertex} \left( \frac{3}{2}, \frac{21}{4} \right)$$

$$8a = -8$$

$$a = -1$$

$$-10 = 4a - 2b$$

$$b = 2a + 5$$

$$-3 = (-1)^2a + (-1)b + 1 \quad 2a + 5 = a + 4 \quad x = \frac{-3}{2(-1)} = \frac{3}{2}$$

$$\text{vertex} \left( \frac{3}{2}, \frac{13}{4} \right)$$

$$-3 = a - b + 1$$

$$a = -1$$

$$b = a + 4 \quad b = -1 + 4 = 3 \quad y = -\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) + 1 = -\frac{9}{4} + \frac{18}{4} + \frac{4}{4} = \frac{13}{4}$$

PTS: 2 REF: 011823ai NAT: F.IF.C.9 TOP: Comparing Functions

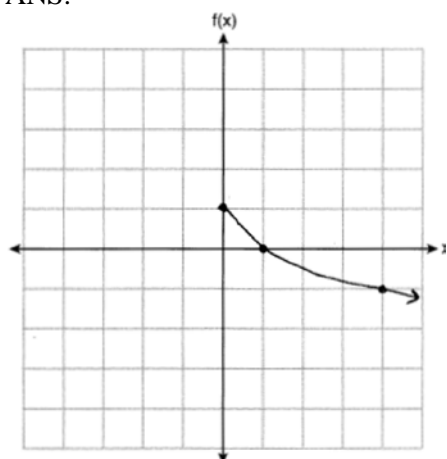
270 ANS: 2

$$\frac{14}{16 + 20 + 14} = 28\%$$

PTS: 2 REF: 011705ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

271 ANS:



PTS: 2 REF: 012025ai NAT: F.IF.C.7 TOP: Graphing Root Functions

272 ANS: 2

$$-2(x - 5) < 10$$

$$x - 5 > -5$$

$$x > 0$$

PTS: 2 REF: 011817ai NAT: A.REI.B.3 TOP: Interpreting Solutions

273 ANS: 1

PTS: 2

REF: 011516ai

NAT: A.CED.A.4

TOP: Transforming Formulas

274 ANS: 3

PTS: 2

REF: 011702ai

NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: factoring

275 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

276 ANS: 4

PTS: 2

REF: 061406ai

NAT: F.LE.A.1

TOP: Families of Functions

277 ANS: 4

PTS: 2

REF: 011912ai

NAT: F.LE.A.2

TOP: Modeling Exponential Functions

278 ANS: 4

$$2(2) < -12(-3) + 4 \quad 4 < -6(-3) + 4$$

$$4 < 40$$

$$4 < 22$$

PTS: 2 REF: 011716ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities

KEY: solution set

279 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

280 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

281 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

282 ANS:  
 $\frac{480 - 140}{7 - 2} = 68$  mph

PTS: 2 REF: 011731ai NAT: F.IF.B.6 TOP: Rate of Change

283 ANS: 1 PTS: 2 REF: 011524ai NAT: A.APR.B.3  
 TOP: Graphing Polynomial Functions

284 ANS:  
 $d = 2c - 5$ ;  $20 \neq 2(15) - 5$  20 dogs is not five less than twice 15 cats  $\frac{c+3}{2c-5+3} = \frac{3}{4}$   $d = 2(9) - 5 = 13$   
 $\frac{c+3}{d+3} = \frac{3}{4}$   $20 \neq 25$   $4c + 12 = 6c - 6$   
 $18 = 2c$   
 $c = 9$

PTS: 6 REF: 011837ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

285 ANS: 4  
 $-2 \neq (-1)^3 - (-1)$   
 $-2 \neq 0$

PTS: 2 REF: 011806ai NAT: A.REI.D.10 TOP: Identifying Solutions

286 ANS:

The rate of speed is expressed in  $\frac{\text{feet}}{\text{minute}}$  because  $\text{speed} = \frac{\text{distance}}{\text{time}}$ .

PTS: 2 REF: 011827ai NAT: A.CED.A.2 TOP: Speed

287 ANS: 4 PTS: 2 REF: 012021ai NAT: F.IF.B.5

TOP: Domain and Range

288 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

289 ANS:

$$15x + 36 = 10x + 48$$

$$5x = 12$$

$$x = 2.4$$

PTS: 2 REF: 011531ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

290 ANS:

Distributive and Addition Property of Equality

PTS: 2 REF: 012029ai NAT: A.REI.A.1 TOP: Identifying Properties

291 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

292 ANS: 4 PTS: 2 REF: 011821ai NAT: A.SSE.B.3

TOP: Modeling Exponential Functions

293 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

294 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

295 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

296 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

297 ANS: 2 PTS: 2 REF: 011619ai NAT: F.IF.A.2

TOP: Domain and Range KEY: real domain, exponential

298 ANS: 3 PTS: 2 REF: 061409ai NAT: F.IF.B.4

TOP: Graphing Quadratic Functions KEY: context

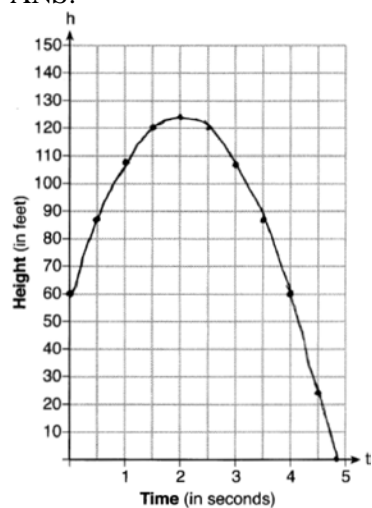
299 ANS: 2

$$6(3x - y = 7)$$

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

PTS: 2 REF: 012020ai NAT: A.REI.C.6 TOP: Solving Linear Systems

300 ANS:



$$\frac{h(2) - h(0)}{2 - 0} = 32$$

PTS: 4 REF: 012033ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: context

301 ANS:

$$p + 2s = 15.95 \quad 5p + 10s = 79.75$$

$$3p + 5s = 45.90 \quad 6p + 10s = 91.80$$

$$p = 12.05$$

PTS: 4 REF: 011734ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

302 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

303 ANS: 4

$$4x^3 + x^2 + 2x$$

PTS: 2 REF: 012024ai NAT: A.SSE.A.1 TOP: Modeling Expressions

304 ANS: 3

PTS: 2

REF: 011515ai

NAT: F.LE.B.5

TOP: Modeling Exponential Functions

305 ANS: 3

PTS: 2

REF: 011813ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: addition

306 ANS: 2

$$-4.9(0)^2 + 50(0) + 2$$

PTS: 2 REF: 011811ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: context

307 ANS: 3

PTS: 2

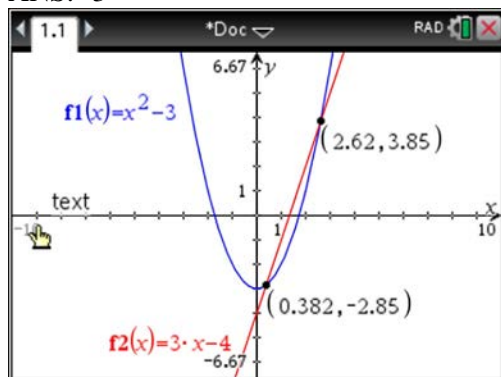
REF: 011711ai

NAT: F.LE.A.1

TOP: Families of Functions

- 308 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
- 309 ANS: 3 PTS: 2 REF: 011622ai NAT: F.IF.C.9  
 TOP: Comparing Functions
- 310 ANS:  
 No. There are infinite solutions.
- PTS: 2 REF: 011725ai NAT: A.REI.C.6 TOP: Solving Linear Systems  
 KEY: substitution
- 311 ANS: 4 PTS: 2 REF: 011801ai NAT: A.REI.A.1  
 TOP: Identifying Properties
- 312 ANS: 4 PTS: 2 REF: 012007ai NAT: F.BF.B.3  
 TOP: Graphing Polynomial Functions
- 313 ANS: 4  
 $(1) \frac{6-1}{1971-1898} = \frac{5}{73} \approx .07$   $(2) \frac{14-6}{1985-1971} = \frac{8}{14} \approx .57$   $(3) \frac{24-14}{2006-1985} = \frac{10}{21} \approx .48$   $(4) \frac{35-24}{2012-2006} = \frac{11}{6} \approx 1.83$
- PTS: 2 REF: 011613ai NAT: F.IF.B.6 TOP: Rate of Change
- 314 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
- 315 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
- 316 ANS: 4 PTS: 2 REF: 011703ai NAT: S.ID.C.8  
 TOP: Correlation Coefficient
- 317 ANS: 4  
 $y + 3 = 6(0)$   
 $y = -3$
- PTS: 2 REF: 011509ai NAT: F.IF.B.4 TOP: Graphing Linear Functions
- 318 ANS: 2 PTS: 2 REF: 011819ai NAT: F.BF.B.3  
 TOP: Graphing Polynomial Functions

319 ANS: 3



PTS: 2 REF: 011810ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems

KEY: algebraically

320 ANS: 1 PTS: 2 REF: 011615ai NAT: F.IF.B.5

TOP: Domain and Range

321 ANS: 3 PTS: 2 REF: 011704ai NAT: A.CED.A.4

TOP: Transforming Formulas

322 ANS: 3 PTS: 2 REF: 011505ai NAT: F.LE.A.1

TOP: Families of Functions

323 ANS: 2 PTS: 2 REF: 011601ai NAT: F.IF.C.8

TOP: Vertex Form of a Quadratic

324 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

325 ANS: 3

$$\frac{5.4 - 4}{4} = 0.35$$

PTS: 2 REF: 011802ai NAT: F.LE.A.2 TOP: Modeling Exponential Functions

326 ANS: 1

$$7x + 2 \geq 58$$

$$7x \geq 56$$

$$x \geq 8$$

PTS: 2 REF: 012003ai NAT: A.REI.B.3 TOP: Interpreting Solutions

327 ANS: 4 PTS: 2 REF: 011608ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

328 ANS: 2 PTS: 2 REF: 011506ai NAT: F.IF.B.5

TOP: Domain and Range



329 ANS: 3

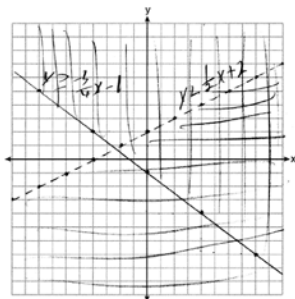
$$18x^2 - 50 = 2(9x^2 - 25) = 2(3x - 5)(3x + 5)$$

PTS: 2 REF: 012006ai NAT: A.SSE.A.2

TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

330 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

331 ANS: 2 PTS: 2 REF: 012014ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

332 ANS:

$$x = 1 \frac{-3 + 5}{2} = 1$$

PTS: 2 REF: 011829ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions

KEY: no context

333 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

334 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

335 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

336 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

337 ANS: 2 PTS: 2 REF: 011717ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

338 ANS: 2

$$f(x) = x^3 - 9x^2 = x^2(x - 9) = 0$$

$$x = 0, 9$$

PTS: 2 REF: 012009ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

339 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

340 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

341 ANS: 4 PTS: 2 REF: 011908ai NAT: A.REI.A.1

TOP: Identifying Properties

342 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

343 ANS: 3 PTS: 2 REF: 011820ai NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities KEY: solution set

344 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

345 ANS: 2

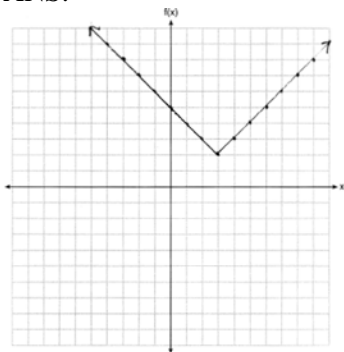
The y-intercept of both  $f(x)$  and  $g(x)$  is  $-4$ .

PTS: 2 REF: 012013ai NAT: F.IF.C.9 TOP: Comparing Functions

- 346 ANS: 1  
 $a_2 = 2(5) - 7 = 3$   $a_3 = 2(3) - 7 = -1$   $a_4 = 2(-1) - 7 = -9$
- PTS: 2 REF: 012023ai NAT: F.IF.A.3 TOP: Sequences  
 KEY: recursive
- 347 ANS: 1 PTS: 2 REF: 011721ai NAT: F.IF.B.6  
 TOP: Rate of Change
- 348 ANS:  
 Linear, because the function grows at a constant rate.  

$$\frac{435 - 348}{14 - 13} = \frac{522 - 435}{15 - 14} = \frac{609 - 522}{16 - 15} = \frac{696 - 609}{17 - 16} = \frac{783 - 696}{18 - 17} = 87$$
- PTS: 2 REF: 011926ai NAT: F.LE.A.1 TOP: Families of Functions
- 349 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
- 350 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
- 351 ANS: 3 PTS: 2 REF: 011910ai NAT: F.BF.B.3  
 TOP: Graphing Polynomial Functions
- 352 ANS: 4 PTS: 2 REF: 012012ai NAT: A.SSE.A.2  
 TOP: Factoring Polynomials KEY: quadratic
- 353 ANS: 3 PTS: 2 REF: 011518ai NAT: A.REI.D.11  
 TOP: Other Systems
- 354 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
- 355 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

356 ANS:



PTS: 2 REF: 011825ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

357 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

358 ANS: 4 PTS: 2 REF: 012022ai NAT: S.ID.A.1

TOP: Dot Plots

359 ANS:

Two of the following: quadratic formula, complete the square, factor by grouping or graphically.

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8} \approx -0.7, -3.3$$

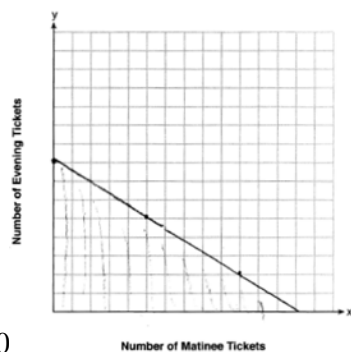
PTS: 4 REF: 011634ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: quadratic formula

360 ANS: 4 PTS: 2 REF: 011719ai NAT: F.IF.B.5

TOP: Domain and Range

361 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

362 ANS: 2 PTS: 2 REF: 011723ai NAT: F.IF.C.9

TOP: Comparing Functions

363 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

364 ANS:

$$6.25a + 4.5(45) \leq 550 \quad 55 \text{ shirts}$$

$$6.25a + 202.5 \leq 550$$

$$6.25a \leq 347.50$$

$$a \leq 55.6$$

PTS: 2

REF: 012026ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

365 ANS: 3

$$y = (-1)^2 - 3(-1) - 2 = 2, \quad y = 4(-1) + 6 = 2$$

PTS: 2

REF: 011918ai

NAT: A.REI.D.11

TOP: Other Systems

366 ANS: 2

$$a_n = 4n + 8$$

$$a_{35} = 4(35) + 8 = 148$$

PTS: 2

REF: 012008ai

NAT: F.IF.A.3

TOP: Sequences

KEY: explicit

367 ANS: 4

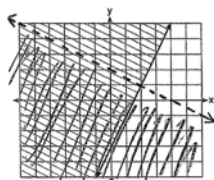
PTS: 2

REF: 011621ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

368 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

369 ANS: 4

PTS: 2

REF: 011917ai

NAT: F.IF.A.2

TOP: Domain and Range

KEY: graph

370 ANS: 2

PTS: 2

REF: 081413ai

NAT: A.CED.A.2

TOP: Graphing Linear Functions

KEY: bimodalgraph

371 ANS: 3

PTS: 2

REF: 011618ai

NAT: F.LE.A.2

TOP: Sequences

KEY: recursive

372 ANS:

$$2p + 3d = 18.25 \quad 4p + 6d = 36.50 \quad 4p + 2(2.25) = 27.50$$

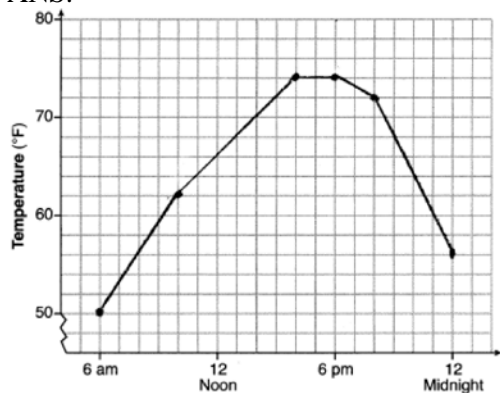
$$4p + 2d = 27.50 \quad 4p + 2d = 27.50 \quad 4p = 23$$

$$4d = 9 \quad p = 5.75$$

$$d = 2.25$$

PTS: 4 REF: 011533ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

373 ANS:



$$, 6\text{am}-4\text{pm}, \frac{74-56}{6-12} = -3$$

PTS: 4 REF: 011936ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

374 ANS: 3 PTS: 2 REF: 011522ai

TOP: Factoring the Difference of Perfect Squares

NAT: A.SSE.A.2

KEY: higher power

375 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

376 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

377 ANS: 2 PTS: 2 REF: 011502ai NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

378 ANS: 4

$$f(4) = q(4) = p(4) = 3$$

PTS: 2 REF: 011921ai NAT: F.IF.C.9 TOP: Comparing Functions

379 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

380 ANS: 3

$$\sqrt{576} = 24 \quad \sqrt{684} = 6\sqrt{19}$$

PTS: 2 REF: 011808ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

381 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

382 ANS: 2

$$f(2) = 2(3^2) + 1 = 19$$

PTS: 2 REF: 012001ai NAT: F.IF.A.2 TOP: Functional Notation

383 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

384 ANS: 3 PTS: 2 REF: 011909ai NAT: A.APR.B.3

TOP: Zeros of Polynomials

385 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

386 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

387 ANS: 3 PTS: 2 REF: 011809ai NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares KEY: higher power388 ANS: 4 PTS: 2 REF: 011616ai NAT: F.LE.A.2  
TOP: Families of Functions389 ANS: 2 PTS: 2 REF: 011919ai NAT: F.LE.A.2  
TOP: Sequences KEY: recursive390 ANS:  
 $2L + 1.5W \geq 500$   $2(144) + 1.5W = 500$  142 bottles of water must be sold to cover the cost of renting costumes.

$$L + W \leq 360 \qquad 1.5W = 212$$

$$W = 141.\bar{3}$$

PTS: 4 REF: 011835ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

391 ANS: 2 PTS: 2 REF: 011512ai NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions392 ANS:  
 $-2x^2 + 6x + 4$ PTS: 2 REF: 011528ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: subtraction393 ANS: 3  
For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the  $x$ -axis.

PTS: 2 REF: 011624ai NAT: S.ID.B.6 TOP: Residuals

394 ANS: 2 PTS: 2 REF: 011501ai NAT: F.LE.B.5  
TOP: Modeling Linear Functions395 ANS: 2 PTS: 2 REF: 012004ai NAT: F.IF.A.1  
TOP: Defining Functions KEY: ordered pairs396 ANS: 3 PTS: 2 REF: 012017ai NAT: F.LE.A.1  
TOP: Families of Functions



397 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

398 ANS:

During 1960-1965 the graph has the steepest slope.

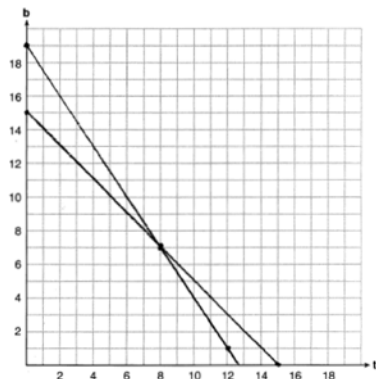
PTS: 2 REF: 011628ai NAT: F.IF.B.6 TOP: Rate of Change

399 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

400 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

401 ANS: 3

$$\frac{138}{192} \approx 72\%$$

PTS: 2 REF: 012010ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

402 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

403 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

404 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

405 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

406 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

407 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

408 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

409 ANS: 4 PTS: 2 REF: 011718ai NAT: A.SSE.A.1

TOP: Modeling Expressions

410 ANS: 3 PTS: 2 REF: 061407ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

411 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

412 ANS: 4 PTS: 2 REF: 011907ai NAT: F.IF.A.1

TOP: Defining Functions KEY: mixed

413 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

414 ANS: 1

$$g(-3) = -2(-3)^2 + 3(-3) = -18 - 9 = -27$$

PTS: 2 REF: 011902ai NAT: F.IF.A.2 TOP: Functional Notation

415 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

416 ANS: 3 PTS: 2 REF: 011818ai NAT: F.LE.A.2

TOP: Sequences KEY: recursive

417 ANS: 1 PTS: 2 REF: 011708ai NAT: F.LE.A.2

TOP: Sequences KEY: recursive

418 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

- 419 ANS: 2                   PTS: 2                   REF: 011901ai           NAT: S.ID.B.6  
TOP: Scatter Plots   KEY: line of best fit
- 420 ANS: 1                   PTS: 2                   REF: 011712ai           NAT: F.IF.C.7  
TOP: Graphing Absolute Value Functions
- 421 ANS: 1                   PTS: 2                   REF: 012002ai           NAT: F.BF.A.1  
TOP: Modeling Exponential Functions   KEY: AI
- 422 ANS: 3                   PTS: 2                   REF: 011724ai           NAT: F.LE.B.5  
TOP: Modeling Exponential Functions
- 423 ANS:  
 $\frac{33 + 12}{180} = 25\%$
- PTS: 2                   REF: 011526ai           NAT: S.ID.B.5           TOP: Frequency Tables  
KEY: two-way
- 424 ANS: 2                   PTS: 2                   REF: 011709ai           NAT: F.LE.B.5  
TOP: Modeling Linear Functions
- 425 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
- 426 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  
427 ANS: 1                   PTS: 2                   REF: 011805ai           NAT: F.LE.A.1  
TOP: Families of Functions
- 428 ANS: 1                   PTS: 2                   REF: 011623ai           NAT: F.LE.A.1  
TOP: Families of Functions
- 429 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

430 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

431 ANS: 1 PTS: 2 REF: 011803ai NAT: A.CED.A.3

TOP: Modeling Linear Systems

432 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

433 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

434 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

435 ANS: 2 PTS: 2 REF: 011815ai NAT: A.REI.C.6

TOP: Solving Linear Systems

436 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

437 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

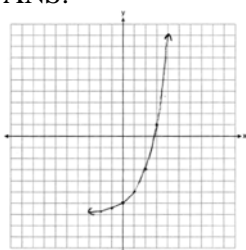
438 ANS:

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

439 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

440 ANS: 1 PTS: 2 REF: 011620ai NAT: F.BF.B.3

TOP: Transformations with Functions KEY: bimodalgraph

441 ANS:

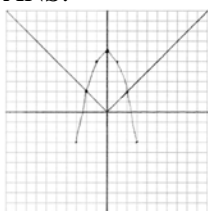
$$1.8 - 0.4y \geq 2.2 - 2y$$

$$1.6y \geq 0.4$$

$$y \geq 0.25$$

PTS: 2 REF: 011727ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

442 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

443 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

444 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

445 ANS:

$$3x^3 + 21x^2 + 36x = 0$$

$$3x(x^2 + 7x + 12) = 0$$

$$3x(x + 4)(x + 3) = 0$$

$$x = 0, -4, -3$$

PTS: 2 REF: 011930ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

446 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

447 ANS: 2 PTS: 2 REF: 081422ai NAT: F.IF.C.7

TOP: Graphing Piecewise-Defined Functions

448 ANS: 1

$$\text{I. } -\frac{5}{8} + \frac{3}{5} = \frac{-1}{40}; \text{ III. } (\sqrt{5}) \cdot (\sqrt{5}) = \frac{5}{1}; \text{ IV. } 3 \cdot (\sqrt{49}) = \frac{21}{1}$$

PTS: 2 REF: 011604ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

449 ANS: 3

$$\sqrt{36} \div \sqrt{225} = \frac{6}{15} \text{ may be expressed as the ratio of two integers.}$$

PTS: 2 REF: 011903ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

450 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

451 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

452 ANS: 4 PTS: 2 REF: 011706ai NAT: A.APR.B.3  
TOP: Zeros of Polynomials

453 ANS: 3

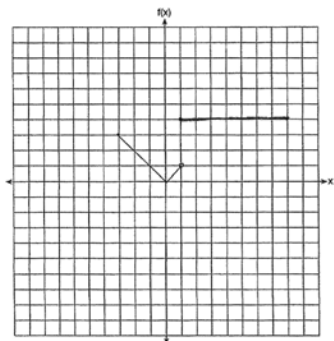
$$f(0 + 1) = -2f(0) + 3 = -2(2) + 3 = -1$$

$$f(1 + 1) = -2f(1) + 3 = -2(-1) + 3 = 5$$

PTS: 2 REF: 011520ai NAT: F.IF.A.3 TOP: Sequences  
KEY: recursive

454 ANS: 2 PTS: 2 REF: 011510ai NAT: A.APR.A.1  
TOP: Operations with Polynomials KEY: multiplication

455 ANS:



PTS: 2 REF: 011530ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

456 ANS: 2 PTS: 2 REF: 011611ai NAT: A.CED.A.1  
TOP: Geometric Applications of Quadratics

457 ANS: 4 PTS: 2 REF: 011503ai NAT: A.REI.B.4  
TOP: Solving Quadratics KEY: factoring

458 ANS: 4 PTS: 2 REF: 011514ai NAT: S.ID.A.2  
TOP: Central Tendency and Dispersion

459 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



460 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

461 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

462 ANS: 2

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

PTS: 2

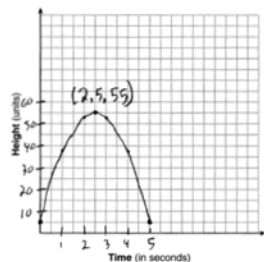
REF: 012016ai

NAT: A.APR.A.1

TOP: Operations with Polynomials

KEY: multiplication

463 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: context

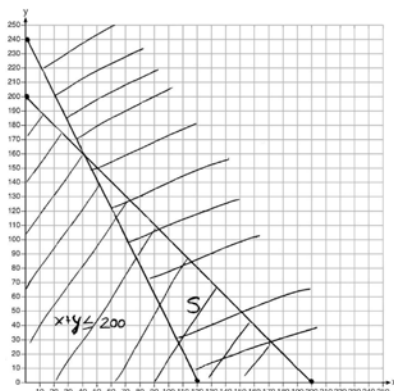
464 ANS:

$$x + y \leq 200 \quad \text{Marta is incorrect because } 12.5(30) + 6.25(80) < 1500$$

$$12.5x + 6.25y \geq 1500$$

$$375 + 500 < 1500$$

$$875 < 1500$$



PTS: 6

REF: 011637ai

NAT: A.REI.D.12

TOP: Graphing Systems of Linear Inequalities

KEY: graph

465 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

466 ANS: 3

PTS: 2

REF: 011612ai

NAT: A.SSE.A.2

TOP: Factoring Polynomials

KEY: higher power

467 ANS: 2

PTS: 2

REF: 011602ai

NAT: A.CED.A.2

TOP: Graphing Linear Functions

468 ANS: 2

PTS: 2

REF: 011714ai

NAT: A.SSE.B.3

TOP: Modeling Exponential Functions

469 ANS: 2

PTS: 2

REF: 011804ai

NAT: F.IF.A.1

TOP: Defining Functions

KEY: graphs

470 ANS: 4

PTS: 2

REF: 011924ai

NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

471 ANS:

Linear, because the function has a constant rate of change.

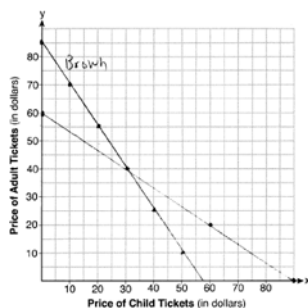
PTS: 2

REF: 011625ai

NAT: F.LE.A.1

TOP: Families of Functions

472 ANS:



$$3x + 2y = 170$$

$$4x + 6y = 360$$

ticket is \$40.

(30,40) The price of a child's ticket is \$30 and the price of an adult's

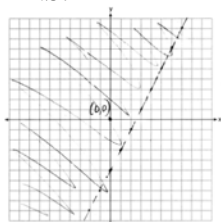
PTS: 6

REF: 012037ai

NAT: A.REI.C.6

TOP: Graphing Linear Systems

473 ANS:



PTS: 2

REF: 011729ai

NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

474 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

475 ANS: 3

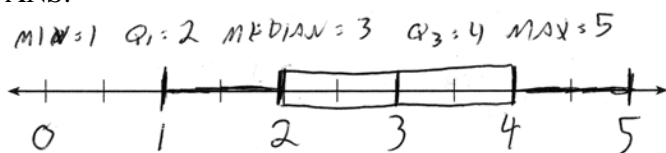
PTS: 2

REF: 061415ai

NAT: F.LE.A.2

TOP: Families of Functions

476 ANS:



PTS: 2

REF: 061432ai

NAT: S.ID.A.1

TOP: Box Plots

KEY: represent

477 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: context

478 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

479 ANS: 3

PTS: 2

REF: 011513ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

480 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

481 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

## Algebra I Regents at Random Answer Section

482 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

483 ANS: 4

PTS: 2

REF: 061422ai

NAT: A.CED.A.2

TOP: Modeling Linear Equations

484 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

485 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

486 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

487 ANS:

$g(x) = x^3 + 2x^2 - 4$ , because  $g(x)$  is a translation down 4 units.

PTS: 2

REF: 061632ai

NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

488 ANS: 1

PTS: 2

REF: 061707ai

NAT: F.LE.A.2

TOP: Families of Functions

489 ANS: 2

PTS: 2

REF: 061916ai

NAT: S.ID.B.6

TOP: Regression KEY: exponential

490 ANS: 1

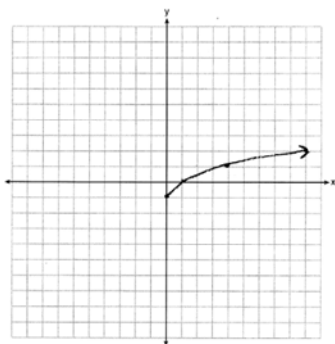
PTS: 2

REF: 061606ai

NAT: F.LE.A.1

TOP: Families of Functions

491 ANS:



PTS: 2 REF: 061425ai NAT: F.IF.C.7 TOP: Graphing Root Functions

492 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

493 ANS: 2

PTS: 2

REF: 062107ai

NAT: A.CED.A.1

TOP: Modeling Linear Inequalities

494 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

495 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

496 ANS: 4

PTS: 2

REF: 061502ai

NAT: F.IF.B.4

TOP: Relating Graphs to Events

497 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

498 ANS: 3

PTS: 2

REF: 061721ai

NAT: F.LE.A.1

TOP: Families of Functions

499 ANS: 1

$$f(3) = -2(3)^2 + 32 = -18 + 32 = 14$$

PTS: 2 REF: 061705ai NAT: F.IF.A.2 TOP: Functional Notation

500 ANS: 3

PTS: 2

REF: 061412ai

NAT: A.APR.B.3

TOP: Zeros of Polynomials

501 ANS: 4                    PTS: 2                    REF: 061901ai                    NAT: A.SSE.A.2  
 TOP: Factoring the Difference of Perfect Squares                    KEY: higher power AI

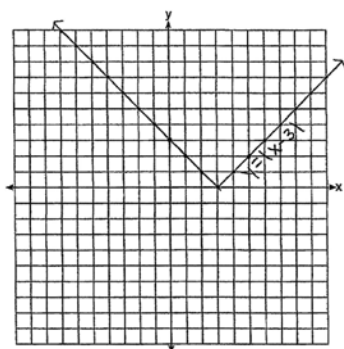
502 ANS:  
 $y < -3x + 3$  Region A represents the solution set of the system. The gray region represents the solution set of  
 $y \leq 2x - 2$   
 $y \leq 2x - 2$ .

PTS: 4                    REF: 061936ai                    NAT: A.CED.A.3                    TOP: Modeling Systems of Linear Inequalities

503 ANS: 3  
 Median remains at 1.4.

PTS: 2                    REF: 061520ai                    NAT: S.ID.A.3                    TOP: Central Tendency and Dispersion

504 ANS:



The graph has shifted three units to the right.

PTS: 2                    REF: 061525ai                    NAT: F.BF.B.3                    TOP: Graphing Absolute Value Functions

505 ANS: 4  
 $4p + 2 < 2p + 10$   
 $2p < 8$   
 $p < 4$

PTS: 2                    REF: 061801ai                    NAT: A.REI.B.3                    TOP: Solving Linear Inequalities

506 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

507 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

508 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

509 ANS: 3

$$a_2 = n(a_{2-1}) = 2 \cdot 1 = 2, a_3 = n(a_{3-1}) = 3 \cdot 2 = 6, a_4 = n(a_{4-1}) = 4 \cdot 6 = 24, a_5 = n(a_{5-1}) = 5 \cdot 24 = 120$$

PTS: 2 REF: 061824ai NAT: F.IF.A.3 TOP: Sequences

KEY: recursive

510 ANS: 4 PTS: 2 REF: 061509ai NAT: F.IF.A.2

TOP: Domain and Range KEY: graph

511 ANS: 3 PTS: 2 REF: 061710ai NAT: A.APR.B.3

TOP: Zeros of Polynomials

512 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 forms

513 ANS: 2 PTS: 2 REF: 061919ai NAT: F.IF.A.3

TOP: Sequences KEY: difference or ratio

514 ANS: 2 PTS: 2 REF: 061516ai NAT: S.ID.C.9

TOP: Analysis of Data

515 ANS: 3 PTS: 2 REF: 061816ai NAT: F.IF.A.2

TOP: Domain and Range KEY: real domain, quadratic

516 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

517 ANS: 2

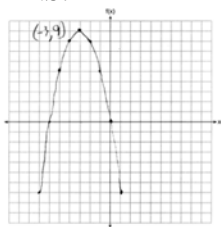
$$\frac{22.7 \text{ m}}{\text{hr}} \times \frac{1 \text{ hr}}{60 \text{ min}} \times \frac{1.609 \text{ km}}{1 \text{ m}} = \frac{0.6 \text{ km}}{\text{min}}$$

PTS: 2 REF: 062123ai NAT: N.Q.A.1 TOP: Conversions

KEY: dimensional analysis



518 ANS:



PTS: 2 REF: 061726ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: no context

519 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

520 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

521 ANS: 3

median = 3, IQR =  $4 - 2 = 2$ ,  $\bar{x} = 2.75$ . An outlier is outside the interval  $[Q_1 - 1.5(IQR), Q_3 + 1.5(IQR)]$ .  
 $[2 - 1.5(2), 4 + 1.5(2)]$

$[-1, 7]$

PTS: 2 REF: 061620ai NAT: S.ID.A.1 TOP: Dot Plots

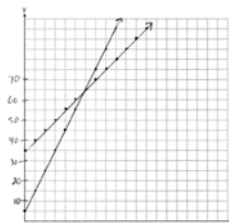
522 ANS: 4 PTS: 2 REF: 061602ia NAT: A.SSE.A.1  
TOP: Modeling Expressions

523 ANS:

$2x^2 + 3x + 10 = 4x + 32$   $x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)} \approx -3.1, 3.6$ . Quadratic formula, because the answer must be  
 $2x^2 - x - 22 = 0$   
to the nearest tenth.

PTS: 4 REF: 061735ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

524 ANS:

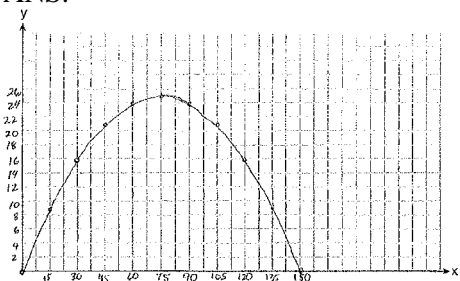


$y = 10x + 5$  In 2016, the swim team and chorus will each have 65 members.

$y = 5x + 35$

PTS: 6 REF: 061737ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

525 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: context

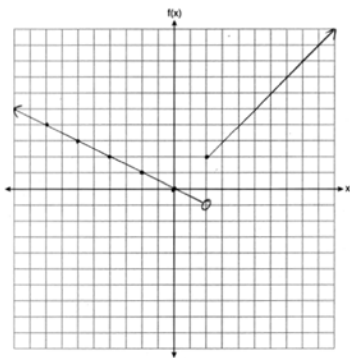
526 ANS: 3      PTS: 2      REF: 061504ai      NAT: F.IF.A.1  
 TOP: Defining Functions      KEY: ordered pairs

527 ANS: 2      PTS: 2      REF: 061712ai      NAT: F.BF.A.1  
 TOP: Modeling Exponential Functions

528 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.

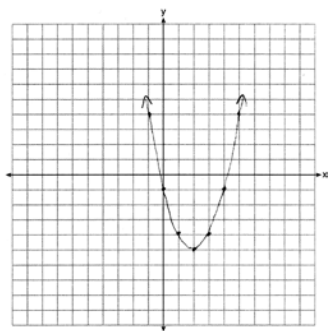
PTS: 2      REF: 061929ai      NAT: F.IF.B.6      TOP: Rate of Change

529 ANS:



PTS: 2      REF: 061832ai      NAT: F.IF.C.7      TOP: Graphing Piecewise-Defined Functions

530 ANS:



$$x = \frac{-b}{2a} = \frac{-(-4)}{2(1)} = \frac{4}{2} = 2$$

PTS: 2 REF: 061627ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions  
KEY: no context

531 ANS: 3

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

PTS: 2 REF: 061908ai NAT: A.APR.B.3 TOP: Graphing Polynomial Functions

532 ANS: 2 PTS: 2 REF: 061503ai NAT: A.SSE.A.2  
TOP: Factoring the Difference of Perfect Squares KEY: multivariable

533 ANS: 2 PTS: 2 REF: 061517ai NAT: F.LE.B.5  
TOP: Modeling Exponential Functions

534 ANS: 2 PTS: 2 REF: 061915ai NAT: A.CED.A.1  
TOP: Modeling Linear Equations

535 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

536 ANS: 4

$$3x^4 - 4x^2 - 4$$

PTS: 2 REF: 062122ai NAT: A.SSE.A.1 TOP: Modeling Expressions

537 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

538 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

539 ANS: 3 PTS: 2 REF: 061709ai NAT: F.IF.A.1

TOP: Defining Functions KEY: ordered pairs

540 ANS: 1 PTS: 2 REF: 061505ai NAT: A.REI.D.12

TOP: Graphing Linear Inequalities

541 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: S.ID.C.7 TOP: Modeling Linear Functions

542 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

543 ANS: 2 PTS: 2 REF: 061617ai NAT: F.BF.A.1

TOP: Modeling Exponential Functions

544 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

545 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

546 ANS:

$$f(x) = 6.50x + 4(12)$$

PTS: 2 REF: 061526ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

547 ANS: 4

$$f(-1) = (-1)^2 - 3(-1) + 4 = 8$$

PTS: 2 REF: 061808ai NAT: A.REI.D.10 TOP: Identifying Solutions

548 ANS: 2

$$7 < \frac{7.2 + 7.6 + p_L}{3} \quad \text{and} \quad \frac{7.2 + 7.6 + p_H}{3} < 7.8$$

$$6.2 < p_L$$

$$p_H < 8.6$$

PTS: 2 REF: 061607ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

549 ANS: 1

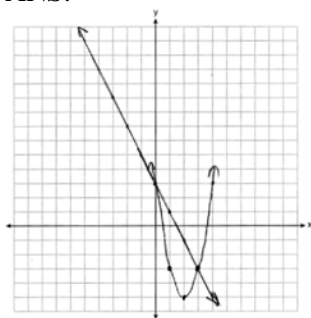
PTS: 2

REF: 061711ai

NAT: A.CED.A.3

TOP: Modeling Systems of Linear Inequalities

550 ANS:



$$x = 0, 3$$

PTS: 4 REF: 061934ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems

551 ANS: 3

PTS: 2

REF: 061819ai

NAT: A.SSE.A.1

TOP: Modeling Expressions

552 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.IF.A.3 TOP: Sequences

KEY: explicit

553 ANS: 4 PTS: 2 REF: 061903ai NAT: F.IF.A.1

TOP: Defining Functions KEY: mixed

554 ANS:

$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi r^2} = h$$

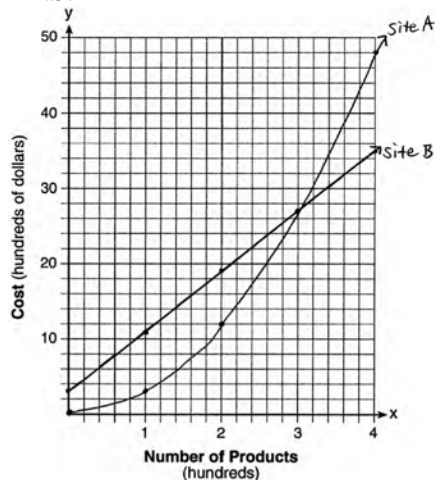
PTS: 2 REF: 061930ai NAT: A.CED.A.4 TOP: Transforming Formulas

555 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

556 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

557 ANS: 4 PTS: 2 REF: 061811ai NAT: F.IF.A.1

TOP: Defining Functions KEY: ordered pairs

558 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

559 ANS: 3 PTS: 2 REF: 062114ai NAT: A.APR.A.1  
 TOP: Powers of Powers

560 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

561 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

562 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: context

563 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

564 ANS: 2 PTS: 2 REF: 061923ai NAT: F.LE.B.5

TOP: Modeling Exponential Functions

565 ANS:

0.5 represents the rate of decay and 300 represents the initial amount of the compound.

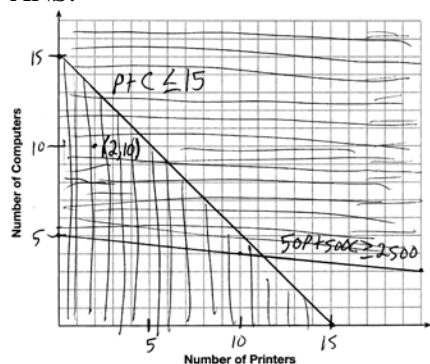
PTS: 2 REF: 061426ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions

566 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

567 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  
 568 ANS: 3 PTS: 2 REF: 061701ai NAT: F.IF.B.4  
 TOP: Relating Graphs to Events

569 ANS:

$$(2w)(w) = 34$$

$$w^2 = 17$$

$$w \approx 4.1$$

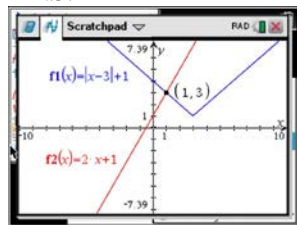
PTS: 2 REF: 061532ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

570 ANS: 2

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

PTS: 2 REF: 061512ai NAT: A.APR.B.3 TOP: Graphing Polynomial Functions

571 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

572 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

573 ANS: 1

PTS: 2

REF: 061521ai NAT: A.REI.B.4

TOP: Solving Quadratics

KEY: taking square roots



574 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

575 ANS: 4 PTS: 2 REF: 062121ai NAT: F.LE.A.2

TOP: Sequences KEY: recursive

576 ANS: 4 PTS: 2 REF: 061720ai NAT: N.Q.A.1

TOP: Conversions KEY: dimensional analysis

577 ANS: 3 PTS: 2 REF: 061501ai NAT: F.LE.B.5

TOP: Modeling Linear Functions

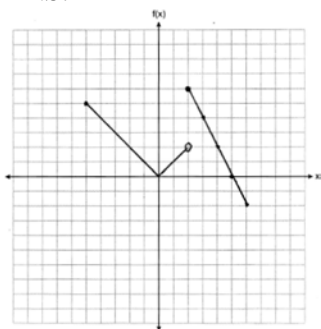
578 ANS: 2

$$f(1) = 2; f(2) = -5(2) + 2 = -8; f(3) = -5(-8) + 2 = 42; f(4) = -5(42) + 2 = -208$$

PTS: 2 REF: 061718ai NAT: F.IF.A.3 TOP: Sequences

KEY: recursive

579 ANS:



PTS: 2 REF: 061927ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

580 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

581 ANS: 1

$$12.5 \text{ sec} \times \frac{1 \text{ min}}{60 \text{ sec}} = 0.208\bar{3} \text{ min}$$

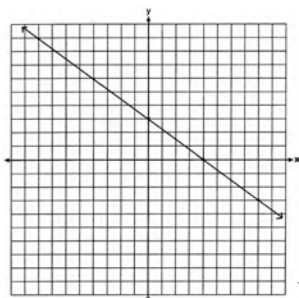
PTS: 2 REF: 061608ai NAT: N.Q.A.1 TOP: Conversions

KEY: dimensional analysis

582 ANS: 2 PTS: 2 REF: 061624ai NAT: F.LE.A.1

TOP: Families of Functions

583 ANS:



No, because (3,2) is not on the graph.

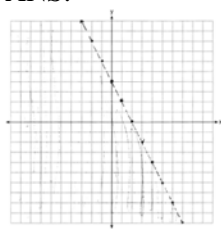
PTS: 2 REF: 061429ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

584 ANS: 4 PTS: 2 REF: 061909ai NAT: A.REI.A.1  
TOP: Identifying Properties585 ANS: 1 PTS: 2 REF: 061507ai NAT: F.IF.C.7  
TOP: Graphing Step Functions KEY: bimodalgraph586 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

587 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: classify588 ANS: 3 PTS: 2 REF: 061411ai NAT: S.ID.C.8  
TOP: Correlation Coefficient589 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 square590 ANS:  
$$5x^2 - 10$$
PTS: 2 REF: 061725ai NAT: A.APR.A.1 TOP: Operations with Polynomials  
KEY: subtraction

591 ANS:



$$y < -2x + 4$$

PTS: 2 REF: 061730ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

592 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

593 ANS:

$$1.25x + 0.55(x + 4) + 0.75(x - 2) = 16 \quad 1.25x + 0.55x + 2.2 + 0.75x - 1.5 = 16$$

$$2.55x + 0.7 = 16$$

$$2.55x = 15.3$$

$$x = 6$$

PTS: 4 REF: 062134ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

594 ANS:

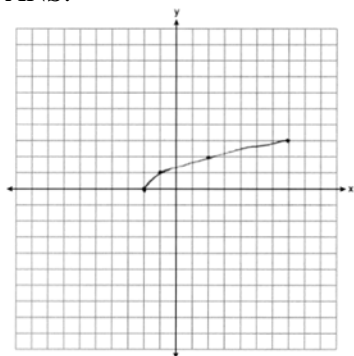
$$\frac{762 - 192}{92 - 32} = \frac{570}{60} = 9.5 \quad y = 9.5x \quad T = 192 + 9.5(120 - 32) = 1028$$

PTS: 4 REF: 061635ai NAT: A.CED.A.2 TOP: Speed

595 ANS: 3 PTS: 2 REF: 061723ai NAT: A.CED.A.4

TOP: Transforming Formulas

596 ANS:



PTS: 2 REF: 061825ai NAT: F.IF.C.7 TOP: Graphing Root Functions

597 ANS:

$$\begin{aligned}
 w(52) - w(38) &= 15(x - 40) + 400 = 445 \quad \text{Since } w(x) > 400, x > 40. \text{ I substituted 445 for } w(x) \text{ and solved} \\
 15(52 - 40) + 400 - 10(38) &= 15(x - 40) = 45 \\
 180 + 400 - 380 &= x - 40 = 3 \\
 200 &= x = 43
 \end{aligned}$$

for  $x$ .

PTS: 4 REF: 061534ai NAT: F.IF.A.2 TOP: Functional Notation

598 ANS: 2 PTS: 2 REF: 061904ai NAT: F.BF.B.3

TOP: Graphing Polynomial Functions

599 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

600 ANS: 2 PTS: 2 REF: 061604ai NAT: S.ID.C.8

TOP: Correlation Coefficient

601 ANS: 2 PTS: 2 REF: 061424ai NAT: F.LE.A.2

TOP: Sequences KEY: explicit

602 ANS: 3

$$a_n = 3n + 1$$

$$a_5 = 3(5) + 1 = 16$$

PTS: 2 REF: 061613ai NAT: F.IF.A.3 TOP: Sequences

KEY: explicit

603 ANS: 2

$$f(-3) = -12 + 5 = -7$$

PTS: 2 REF: 061902ai NAT: F.IF.A.2 TOP: Functional Notation

604 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

605 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

606 ANS: 1 PTS: 2 REF: 061420ai NAT: F.IF.A.2

TOP: Functional Notation

607 ANS: 1

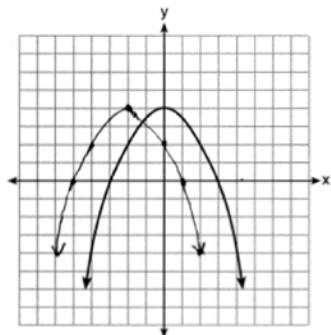
$$3(-2x + 2x + 8) = 12$$

$$24 \neq 12$$

PTS: 2 REF: 061708ai NAT: A.REI.C.6 TOP: Solving Linear Systems

KEY: substitution

608 ANS:



PTS: 2 REF: 061828ai NAT: F.BF.B.3 TOP: Transformations with Functions

609 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

610 ANS: 4 PTS: 2 REF: 061814ai NAT: F.LE.A.1

TOP: Families of Functions

611 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 AI

612 ANS: 3

$$10.25 \neq 3(1.25)^2 - 1.25 + 7$$

PTS: 2 REF: 061918ai NAT: A.REI.D.10 TOP: Identifying Solutions

613 ANS: 4

$$31 = 4 + (10 - 1)3$$

PTS: 2 REF: 062118ai NAT: F.LE.A.2 TOP: Sequences

KEY: explicit

614 ANS: 4

$$\frac{750 + 2.25p}{p} > 2.75 \quad \frac{750 + 2.25p}{p} < 3.25$$

$$750 + 2.25p > 2.75p \quad 750 + 2.25p < 3.25p$$

$$750 > .50p \quad 750 < p$$

$$1500 > p$$

PTS: 2 REF: 061524ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

615 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

616 ANS: 4

$$\frac{30}{30 + 12 + 8} = 0.6$$

PTS: 2 REF: 061615ai NAT: S.ID.B.5 TOP: Frequency Tables

KEY: two-way

617 ANS: 1

PTS: 2

REF: 061905ai

NAT: A.SSE.A.1

TOP: Modeling Expressions

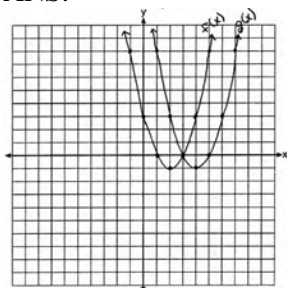
618 ANS: 3

$\sqrt{16} + \sqrt{9} = \frac{7}{1}$  may be expressed as the ratio of two integers.

PTS: 2 REF: 061413ai NAT: N.RN.B.3 TOP: Operations with Radicals

KEY: classify

619 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

620 ANS: 1 PTS: 2 REF: 061922ai NAT: S.ID.A.2

TOP: Dispersion KEY: basic

621 ANS: 4

Vertex (15, 25), point (10, 12.5)  $12.5 = a(10 - 15)^2 + 25$

$$-12.5 = 25a$$

$$-\frac{1}{2} = a$$

PTS: 2 REF: 061716ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

622 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

623 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

624 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

625 ANS: 3  
 $x = 3$

PTS: 2 REF: 061717ai NAT: F.IF.C.9 TOP: Comparing Functions

626 ANS: 2 PTS: 2 REF: 061805ai NAT: S.ID.A.1  
 TOP: Box Plots KEY: interpret

627 ANS: 3 PTS: 2 REF: 061706ai NAT: A.SSE.A.2  
 TOP: Factoring the Difference of Perfect Squares KEY: higher power

628 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

629 ANS: 4 PTS: 2 REF: 061823ai NAT: A.CED.A.4  
 TOP: Transforming Formulas

630 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

631 ANS: 1  
 The zeros of  $f$  are -6, -3 and 0.

PTS: 2 REF: 062112ai NAT: A.APR.B.3 TOP: Graphing Polynomial Functions  
 KEY: bimodalgraph

632 ANS:

$$4y - 12 \leq 8y + 4$$

$$-16 \leq 4y$$

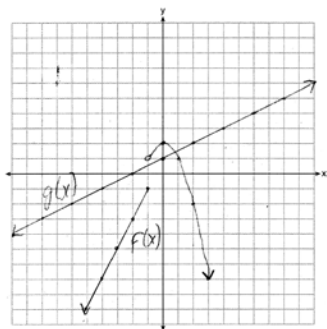
$$-4 \leq y$$

PTS: 2 REF: 062125ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

633 ANS: 4 PTS: 2 REF: 061703ai NAT: F.IF.C.7  
 TOP: Graphing Root Functions KEY: bimodalgraph



634 ANS:



1, because the graphs only intersect once.

PTS: 4 REF: 061636ai NAT: A.REI.D.11 TOP: Other Systems

635 ANS: 4 PTS: 2 REF: 061623ai NAT: F.IF.B.5

TOP: Domain and Range

636 ANS:

 $1 - 0.85 = 0.15 = 15\%$  To find the rate of change of an equation in the form  $y = ab^x$ , subtract  $b$  from 1.

PTS: 2 REF: 061728ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions

637 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

638 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

639 ANS: 2 PTS: 2 REF: 061821ai NAT: F.IF.B.5

TOP: Domain and Range

640 ANS:

 $2x^2 + 5x - 42 = 0$  Agree, as shown by solving the equation by factoring.

$$(x+6)(2x-7) = 0$$

$$x = -6, \frac{7}{2}$$

PTS: 2 REF: 061628ai NAT: A.REI.B.4 TOP: Solving Quadratics

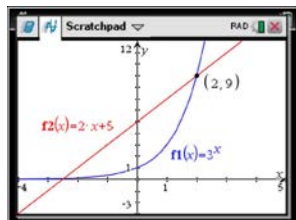
KEY: factoring

641 ANS: 2                   PTS: 2                   REF: 061702ai           NAT: A.SSE.A.1  
TOP: Dependent and Independent Variables

642 ANS:  
 $A = 600(1.016)^2 \approx 619.35$

PTS: 2                   REF: 061529ai           NAT: A.CED.A.1           TOP: Modeling Exponential Functions

643 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

644 ANS:  
 $A(x) = 7 + 3(x - 2)$     $7 + 3(x - 2) = 6.50 + 3.25(x - 2)$

$$B(x) = 3.25x \qquad 7 + 3x - 6 = 3.25x$$

$$1 = 0.25x$$

$$4 = x$$

PTS: 4                   REF: 061834ai           NAT: A.CED.A.3           TOP: Modeling Linear Systems

645 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

646 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

647 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 Functions

648 ANS: 3

PTS: 2

REF: 062110ai

NAT: A.SSE.A.2

TOP: Factoring Polynomials

KEY: quadratic

649 ANS: 2

$$\frac{26}{42 + 26} = 0.382$$

PTS: 2

REF: 061912ai

NAT: S.ID.B.5

TOP: Frequency Tables

KEY: two-way

650 ANS: 2

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

$$6x - 2y = 8$$

PTS: 2

REF: 061414ai

NAT: A.REI.C.6

TOP: Solving Linear Systems

651 ANS:

$$f(x) = x^2 - 14x + 49 - 15 - 49 = (x - 7)^2 - 64 \quad (7, -64)$$

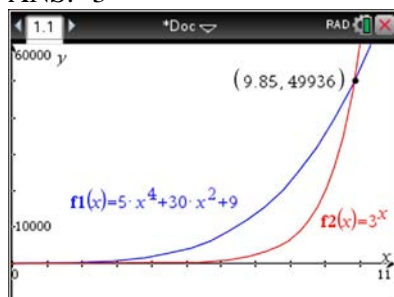
PTS: 2

REF: 062130ai

NAT: F.IF.C.8

TOP: Vertex Form of a Quadratic

652 ANS: 3



PTS: 2

REF: 061621ai

NAT: F.LE.A.3

TOP: Families of Functions

653 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

654 ANS: 1

PTS: 2

REF: 061714ai

NAT: S.ID.C.8

TOP: Correlation Coefficient

655 ANS: 2

PTS: 2

REF: 061416ai

NAT: A.CED.A.1

TOP: Modeling Linear Equations

656 ANS:

$$4c + 3f = 16.53 \quad \text{No, because } 5(2.49) + 4(2.87) \neq 21.11. \quad 16c + 12f = 66.12 \quad 4(2.79) + 3f = 16.53$$

$$5c + 4f = 21.11$$

$$\underline{15c + 12f = 63.33}$$

$$3f = 5.37$$

$$c = 2.79$$

$$f = 1.79$$

PTS: 6

REF: 061937ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems

657 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

658 ANS: 3

PTS: 2

REF: 061911ai

NAT: F.LE.A.1

TOP: Families of Functions

659 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 Functions

- 660 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: context
- 661 ANS: 1 PTS: 2 REF: 061810ai NAT: A.SSE.A.2  
 TOP: Factoring Polynomials KEY: quadratic
- 662 ANS: 2 PTS: 2 REF: 061513ai NAT: F.LE.A.2  
 TOP: Families of Functions
- 663 ANS:  
 $-3x + 7 - 5x < 15$  0 is the smallest integer.  
 $-8x < 8$   
 $x > -1$
- PTS: 2 REF: 061530ai NAT: A.REI.B.3 TOP: Interpreting Solutions
- 664 ANS: 3  
 $b^2 - 4ac = 2^2 - 4(4)(5) = -76$
- PTS: 2 REF: 061822ai NAT: A.REI.B.4 TOP: Using the Discriminant
- 665 ANS: 3 PTS: 2 REF: 061601ai NAT: A.SSE.A.2  
 TOP: Factoring the Difference of Perfect Squares KEY: higher power
- 666 ANS: 1 PTS: 2 REF: 061910ai NAT: A.CED.A.1  
 TOP: Modeling Linear Inequalities
- 667 ANS:  
 $a_2 = 2(3 + 1) = 8$   $a_3 = 2(8 + 1) = 18$   $a_4 = 2(18 + 1) = 38$
- PTS: 2 REF: 061931ai NAT: F.IF.A.3 TOP: Sequences  
 KEY: recursive
- 668 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
- 669 ANS:  
 $\frac{S}{180} = n - 2$   
 $\frac{S}{180} + 2 = n$
- PTS: 2 REF: 061631ai NAT: A.CED.A.4 TOP: Transforming Formulas

670 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

671 ANS: 1 PTS: 2 REF: 061906ai NAT: F.LE.A.1

TOP: Families of Functions

672 ANS:

There is 2 inches of snow every 4 hours.

PTS: 2 REF: 061630ai NAT: S.ID.C.7 TOP: Modeling Linear Functions

673 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

674 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

675 ANS: 1

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

PTS: 2 REF: 062115ai NAT: F.IF.C.9 TOP: Comparing Functions

676 ANS: 4 PTS: 2 REF: 062104ai NAT: F.IF.A.1

TOP: Defining Functions

KEY: ordered pairs

677 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

678 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

679 ANS: 4

$$a + 7b > -8b$$

$$a > -15b$$

PTS: 2 REF: 061913ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

680 ANS:

Graph A is a good fit because it does not have a clear pattern, whereas Graph B does.

PTS: 2 REF: 061531ai NAT: S.ID.B.6 TOP: Residuals

681 ANS: 4

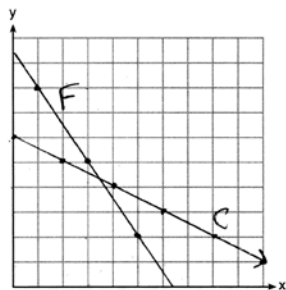
PTS: 2

REF: 062117ai

NAT: F.LE.A.1

TOP: Families of Functions

682 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

683 ANS:

$$x^2 + 3x - 18 = 0 \quad \text{The zeros are the } x\text{-intercepts of } r(x).$$

$$(x+6)(x-3) = 0$$

$$x = -6, 3$$

PTS: 4 REF: 061733ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

684 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

685 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

686 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

687 ANS: 2

$$2x + 6y = 20 \quad x + 3(6) = 10 \quad -2x + 2y = 28 \quad -x + 6 = 14$$

$$\frac{-2x - 2y = 4}{4y = 24} \quad x = -8 \quad \frac{2x + 6y = 20}{8y = 48} \quad -x = 8$$

$$y = 6 \quad y = 6 \quad x = -8$$

PTS: 2 REF: 062120ai NAT: A.REI.C.6 TOP: Solving Linear Systems

688 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

689 ANS: 3

PTS: 2 REF: 061817ai NAT: F.LE.B.5  
TOP: Modeling Linear Functions

690 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

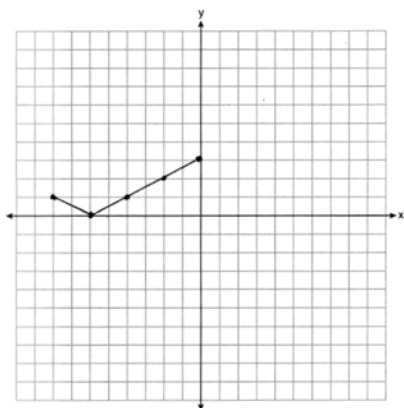
691 ANS: 1

$\sqrt{2} \cdot \sqrt{18} = \sqrt{36} = \frac{6}{1}$  may be expressed as the ratio of two integers.

PTS: 2 REF: 061907ai NAT: N.RN.B.3 TOP: Operations with Radicals  
KEY: classify



692 ANS:



PTS: 2

REF: 062126ai

NAT: F.IF.C.7

TOP: Graphing Absolute Value Functions

693 ANS: 4

$$47 - 4x < 7$$

$$-4x < -40$$

$$x > 10$$

PTS: 2

REF: 061713ai

NAT: A.REI.B.3

TOP: Interpreting Solutions

694 ANS: 1

PTS: 2

REF: 061603ai

NAT: F.IF.B.6

TOP: Rate of Change

695 ANS:

$y = 1.72x + 69.4$ , 0.97, high, positive correlation between the number of jumping jacks and heart rate

PTS: 4

REF: 062133ai

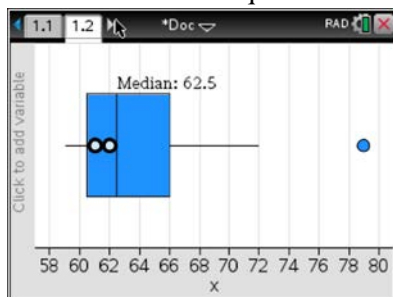
NAT: S.ID.B.6

TOP: Regression

KEY: linear with correlation coefficient

696 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

697 ANS: 4

$$x^2 - 5x = -3$$

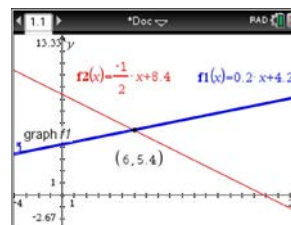
$$x^2 - 5x + \frac{25}{4} = \frac{-12}{4} + \frac{25}{4}$$

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

PTS: 2 REF: 061518ai NAT: A.REI.B.4 TOP: Solving Quadratics

KEY: completing the square

698 ANS: 4



$$m = \frac{5 - 4.6}{4 - 2} = \frac{.4}{2} = 0.2 \quad 4(0.2x + 4.2) + 2x = 33.6 \quad y = 0.2(6) + 4.2 = 5.4$$

$$5 = .2(4) + b$$

$$0.8x + 16.8 + 2x = 33.6$$

$$4.2 = b$$

$$2.8x = 16.8$$

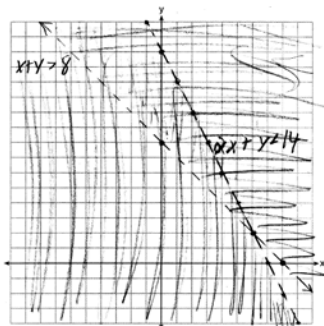
$$y = 0.2x + 4.2$$

$$x = 6$$

PTS: 2 REF: 061618ai NAT: A.REI.C.6 TOP: Solving Linear Systems

KEY: substitution

699 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

700 ANS: 4

PTS: 2

REF: 061421ai

NAT: F.LE.A.2

TOP: Sequences

KEY: recursive

701 ANS: 2

PTS: 2

REF: 061508ai

NAT: N.RN.B.3

TOP: Operations with Radicals

KEY: classify

702 ANS: 3

PTS: 2

REF: 061820ai

NAT: F.IF.C.9

TOP: Comparing Functions

703 ANS:

$$x^2 = x$$

$$x^2 - x = 0$$

$$x(x - 1) = 0$$

$$x = 0, 1$$

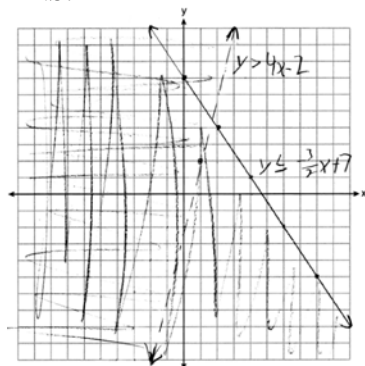
PTS: 2

REF: 061731ai

NAT: A.REI.D.11

TOP: Quadratic-Linear Systems

704 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

705 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

706 ANS: 2

PTS: 2

REF: 061818ai

NAT: A.APR.B.3

TOP: Graphing Polynomial Functions

707 ANS: 4

PTS: 2

REF: 061920ai

NAT: F.IF.B.5

TOP: Domain and Range

708 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 square

709 ANS: 1

PTS: 2

REF: 061806ai

NAT: A.CED.A.3

TOP: Modeling Linear Inequalities

- 710 ANS: 2                   PTS: 2                   REF: 061704ai           NAT: S.ID.C.7  
TOP: Modeling Linear Functions
- 711 ANS: 3                   PTS: 2                   REF: 061522ai           NAT: F.LE.A.2  
TOP: Sequences   KEY: recursive
- 712 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: A.REI.B.4           TOP: Solving Quadratics  
KEY: taking square roots
- 713 ANS: 3                   PTS: 2                   REF: 062119ai           NAT: S.ID.A.1  
TOP: Box Plots   KEY: interpret
- 714 ANS:  
 $9C = 5F - 160$   
 $F = \frac{9C + 160}{5}$
- PTS: 2                   REF: 062131ai           NAT: A.CED.A.4           TOP: Transforming Formulas
- 715 ANS: 2                   PTS: 2                   REF: 062101ai           NAT: F.BF.A.1  
TOP: Modeling Linear Functions
- 716 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
- 717 ANS: 3                   PTS: 2                   REF: 061917ai           NAT: A.SSE.A.2  
TOP: Factoring Polynomials   KEY: quadratic
- 718 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: context

719 ANS:

$$10d + 25q = 1755, 10(90 - q) + 25q = 1755, \text{ no, because } 20.98 \cdot 1.08 > 90 \cdot 0.25$$

$$d + q = 90 \quad 900 - 10q + 25q = 1755$$

$$15q = 855$$

$$q = 57$$

PTS: 6

REF: 061837ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems

720 ANS: 1

$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

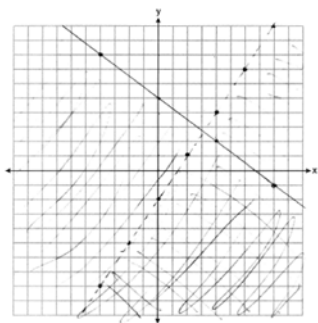
PTS: 2

REF: 061423ai

NAT: A.CED.A.4

TOP: Transforming Formulas

721 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

722 ANS:

$$y = 80(1.5)^x \quad 80(1.5)^{26} \approx 3,030,140. \text{ No, because the prediction at } x = 52 \text{ is already too large.}$$

PTS: 4

REF: 061536ai

NAT: S.ID.B.6

TOP: Regression

KEY: exponential

723 ANS: 1

PTS: 2

REF: 061605ai

NAT: A.CED.A.3

TOP: Modeling Linear Systems

724 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

725 ANS: 3                   PTS: 2                   REF: 062113ai           NAT: F.BF.B.3  
TOP: Graphing Polynomial Functions

726 ANS: 2                   PTS: 2                   REF: 062116ai           NAT: F.IF.B.5  
TOP: Domain and Range