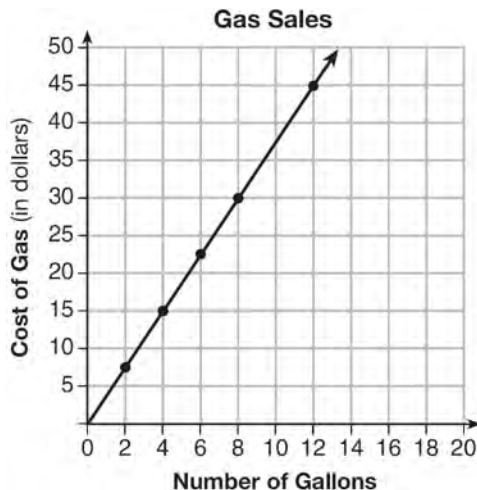# JMAP
REGENTS AT RANDOM

NY Algebra I CCSS Regents Exam Questions
from Spring 2013 to January 2017 Sorted at Random

www.jmap.org

Algebra I Common Core State Standards Regents at Random

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

Gas Sales

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

2 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

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

4 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.
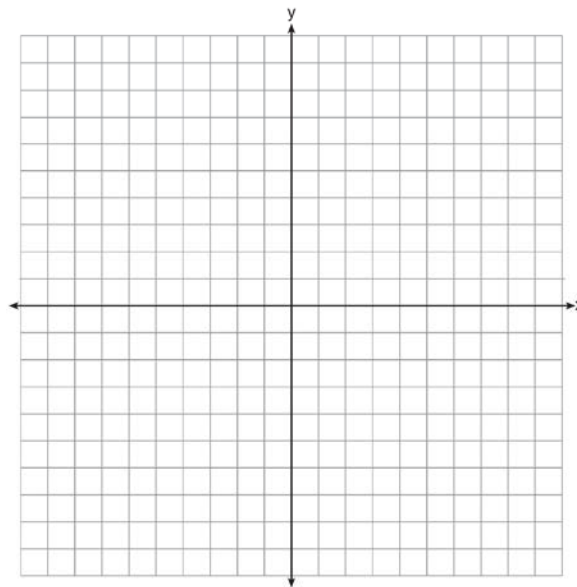
5 Which expression is equivalent to $16x^2 - 36$?
1) $4(2x-3)(2x-3)$
2) $4(2x+3)(2x-3)$
3) $(4x-6)(4x-6)$
4) $(4x+6)(4x+6)$

6 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.

7 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

8 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.

9 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

10 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

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

2

12 The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?
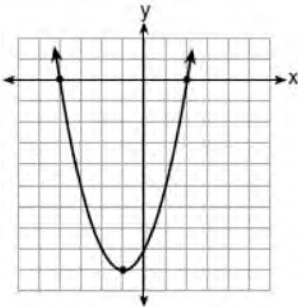
Year	1898	1971	1985	2006	2012
Cost (¢)	1	6	14	24	35

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

13 Which function has zeros of -4 and 2?
1) $f(x) = x^2 + 7x - 8$
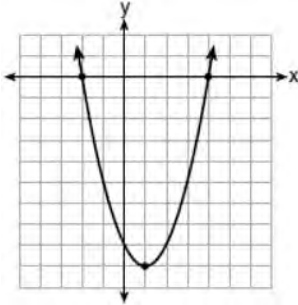
2)
3) $g(x) = x^2 - 7x - 8$

4)

14 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.

15 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) $0.75(7) + 1.25b \leq 22$

16 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

3

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

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

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*. Using this equation, predict the slope of a beach, to the *nearest tenth of a degree*, on a beach with grains of sand having a median diameter of 0.65 mm.

18 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

19 The function $h(t) = -16t^2 + 144$ represents the height, $h(t)$, in feet, of an object from the ground at t seconds after it is dropped. A realistic domain for this function is
1) $-3 \le t \le 3$
2) $0 \le t \le 3$
3) $0 \le h(t) \le 144$
4) all real numbers

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

21 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.

22 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

23 Which recursively defined function represents the sequence $3, 7, 15, 31, \ldots$?
1) $f(1) = 3$, $f(n+1) = 2^{f(n)} + 3$
2) $f(1) = 3$, $f(n+1) = 2^{f(n)} - 1$
3) $f(1) = 3$, $f(n+1) = 2f(n) + 1$
4) $f(1) = 3$, $f(n+1) = 3f(n) - 2$

4

24 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	$2900	$3080	$2500	$2380	$2200	$2700	$3000	$3620	$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*. State the correlation coefficient, r, of the data to the *nearest hundredth*. Does r indicate a strong linear relationship between the variables? Explain your reasoning.

25 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

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

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

28 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) $(p + 3)(p - 3)(p + 3)(p - 3)$

29 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.

30 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

31 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.

32 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.

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

34 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

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

1)

2)

3)

4)
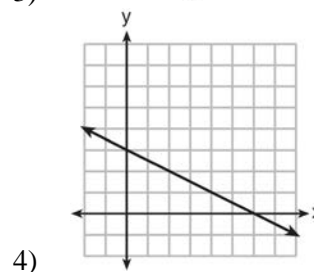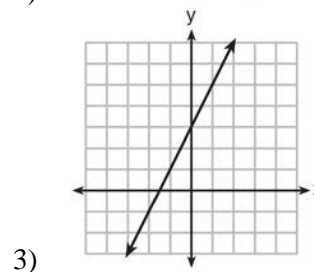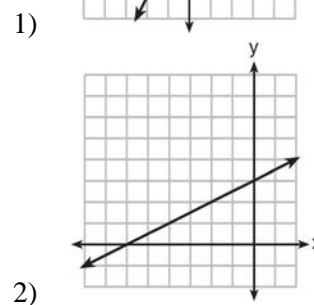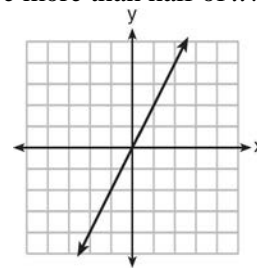
36 Which trinomial is equivalent to
$3(x-2)^2 - 2(x-1)$?
1) $3x^2 - 2x - 10$
2) $3x^2 - 2x - 14$
3) $3x^2 - 14x + 10$
4) $3x^2 - 14x + 14$

37 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.

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

39 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*.

40 The graph of an inequality is shown below.
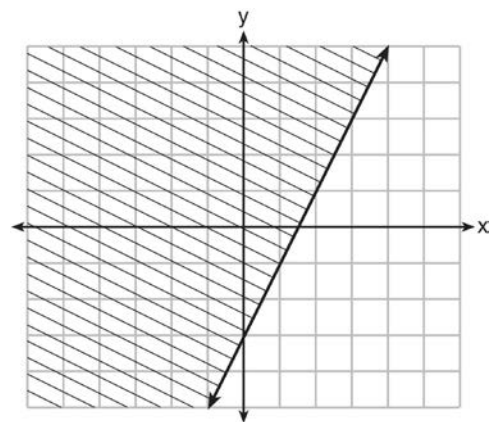
a) Write the inequality represented by the graph.
b) On the same set of axes, graph the inequality $x + 2y < 4$.
c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point $(2,1)$ is in the solution set for this system of inequalities. Determine and state whether you agree with Oscar. Explain your reasoning.

7

41 Marcel claims that the graph below represents a function.
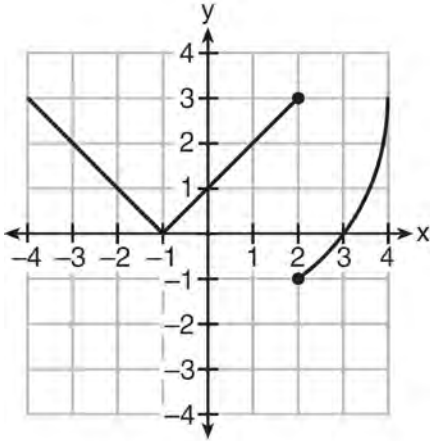
State whether Marcel is correct. Justify your answer.

42 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

43 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.

44 Last week, a candle store received $355.60 for selling 20 candles. Small candles sell for $10.98 and large candles sell for $27.98. How many large candles did the store sell?
1)   6
2)   8
3)   10
4)   12

45 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) $3.00a + 1.50s$

46 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) $3000(1 - 0.02)^{18}$

47 On the set of axes below, graph the inequality $2x + y > 1$.
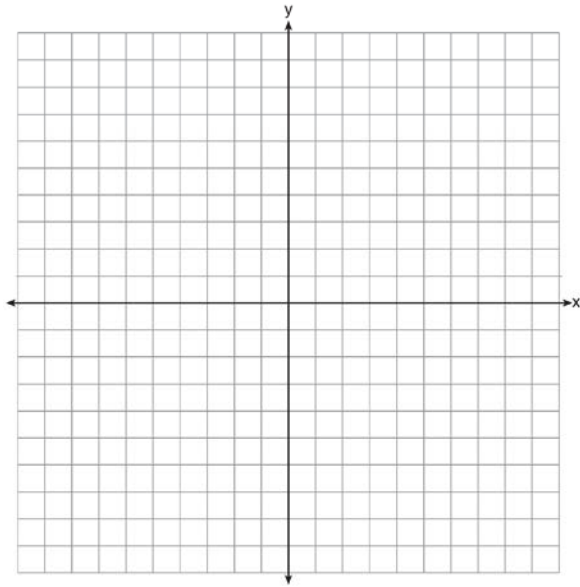
48 Write an exponential equation for the graph shown below.
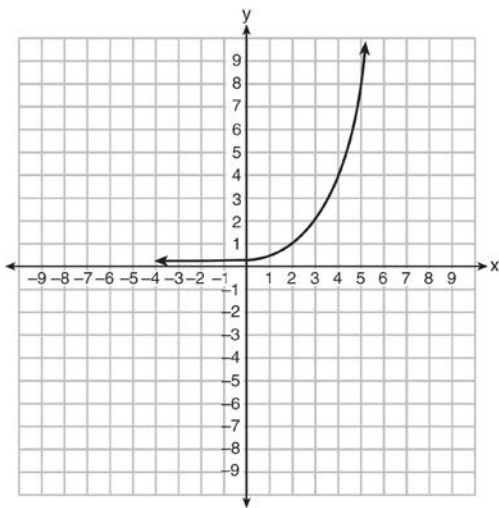
Explain how you determined the equation.

49 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
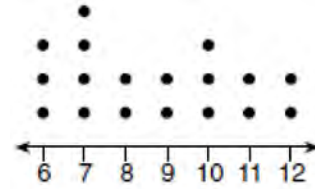
Which statement about the given data sets is correct?
1) The data for soccer players are skewed right.
2) The data for soccer players have less spread than the data for basketball players.
3) The data for basketball players have the same median as the data for soccer players.
4) The data for basketball players have a greater mean than the data for soccer players.

50 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) $6x^2 - 6x - 11$

51 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.
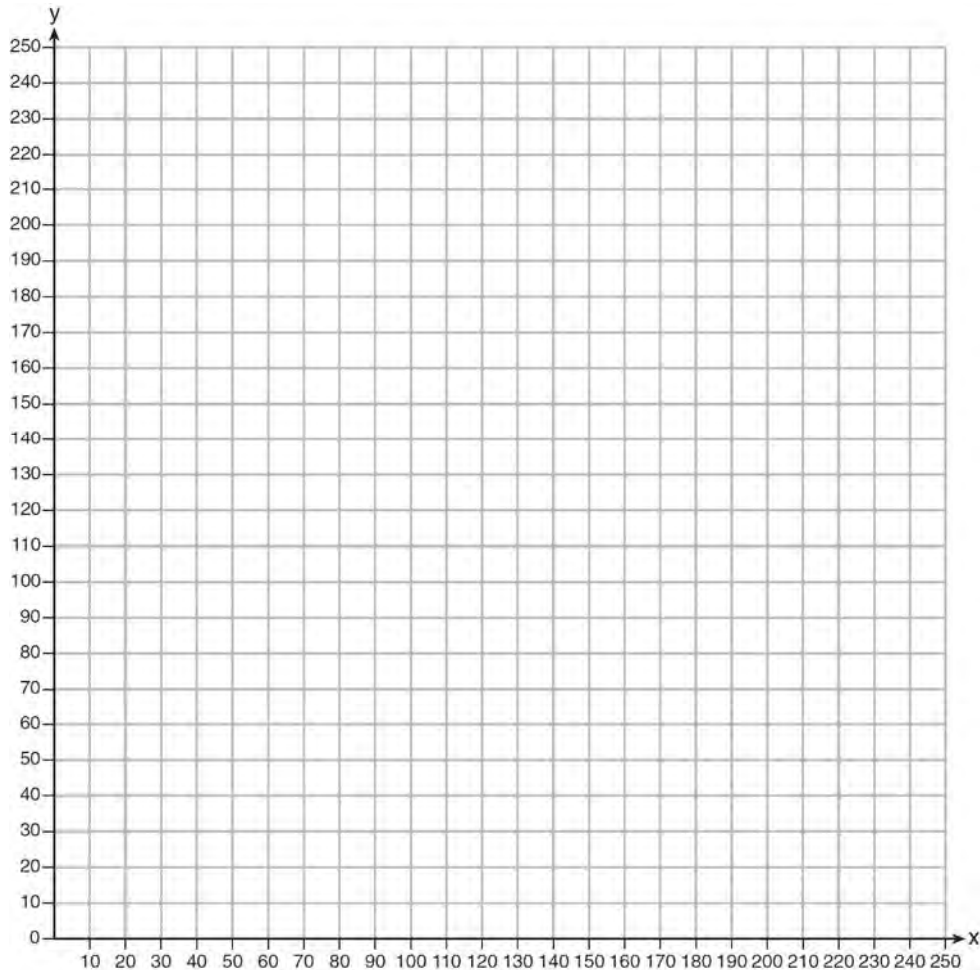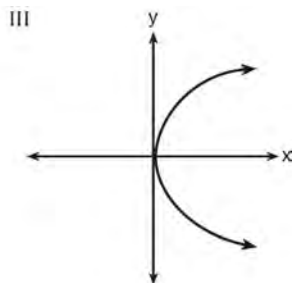
52 The equation for the volume of a cylinder is $V = \pi r^2 h$. The positive value of r, in terms of h and V, is

1) $r = \sqrt{\dfrac{V}{\pi h}}$

2) $r = \sqrt{V\pi h}$

3) $r = 2V\pi h$

4) $r = \dfrac{V}{2\pi}$

53 Which representations are functions?

I

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

III



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

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

54 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.

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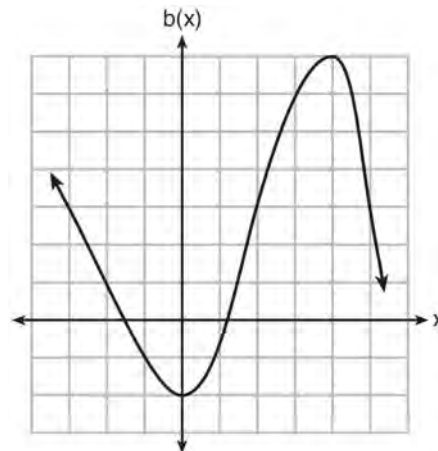
The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

56 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 $g(t)$.

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

11

58 A function is graphed on the set of axes below.
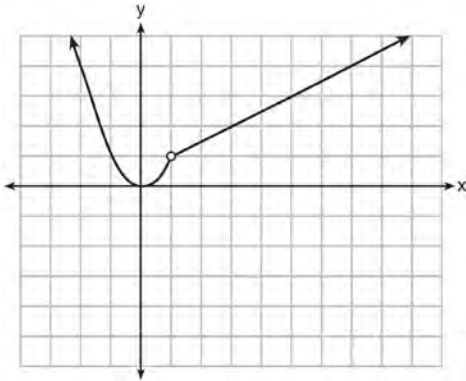
Which function is related to the graph?

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

2) $f(x) = \begin{cases} x^2, x < 1 \\ \dfrac{1}{2}x + \dfrac{1}{2}, x > 1 \end{cases}$

3) $f(x) = \begin{cases} x^2, x < 1 \\ 2x - 7, x > 1 \end{cases}$

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

59 Connor wants to attend the town carnival. The price of admission to the carnival is $4.50, and each ride costs an additional 79 cents. If he can spend at most $16.00 at the carnival, which inequality can be used to solve for r, the number of rides Connor can go on, and what is the maximum number of rides he can go on?

1) $0.79 + 4.50r \le 16.00$; 3 rides
2) $0.79 + 4.50r \le 16.00$; 4 rides
3) $4.50 + 0.79r \le 16.00$; 14 rides
4) $4.50 + 0.79r \le 16.00$; 15 rides

60 The graph below shows the variation in the average temperature of Earth's surface from 1950-2000, according to one source.
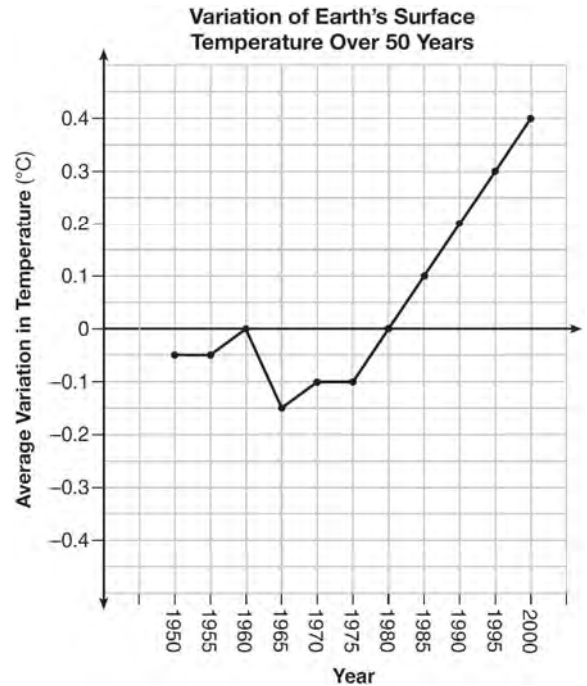
During which years did the temperature variation change the most per unit time? Explain how you determined your answer.
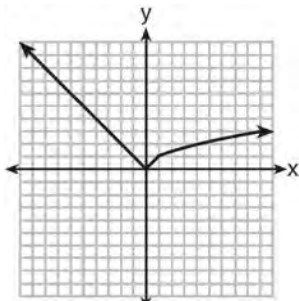
61 A car leaves Albany, NY, and travels west toward Buffalo, NY. The equation $D = 280 - 59t$ can be used to represent the distance, D, from Buffalo after t hours. In this equation, the 59 represents the

1) car's distance from Albany
2) speed of the car
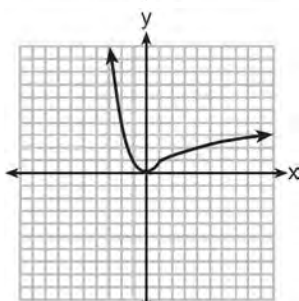3) distance between Buffalo and Albany
4) number of hours driving

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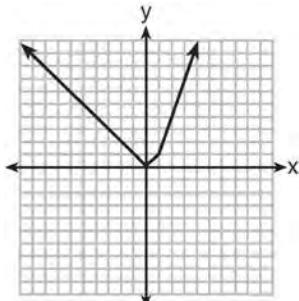
1)

2)

3)
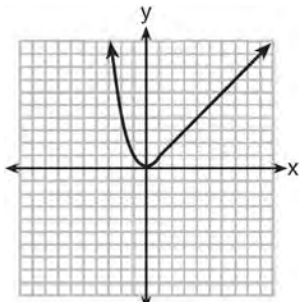
4)

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

64 Based on the graph below, which expression is a possible factorization of $p(x)$?
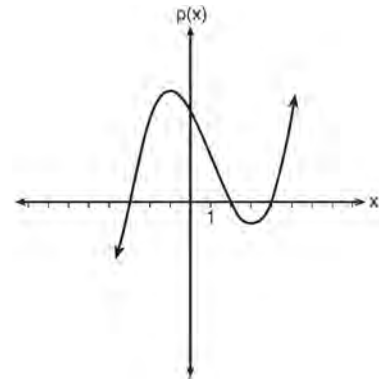
1) $(x+3)(x-2)(x-4)$
2) $(x-3)(x+2)(x+4)$
3) $(x+3)(x-5)(x-2)(x-4)$
4) $(x-3)(x+5)(x+2)(x+4)$

65 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.

66 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.

13

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

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

1)

2)

3)

4)
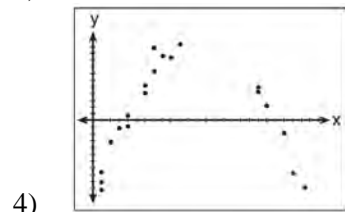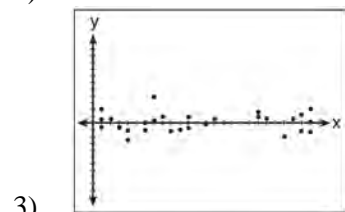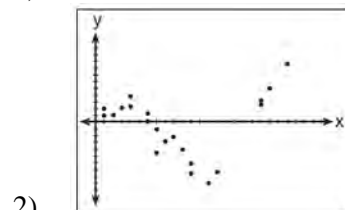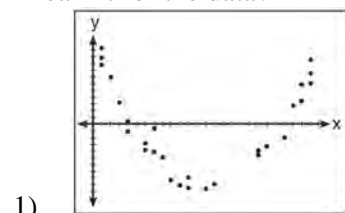
69 Which chart could represent the function
$f(x) = -2x + 6$?

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)

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

14

71 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

72 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

73 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.]

74 Faith wants to use the formula $C(f) = \dfrac{5}{9}(f - 32)$ to
convert degrees Fahrenheit, f, to degrees Celsius,
$C(f)$. If Faith calculated $C(68)$, what would her
result be?
1) 20° Celsius
2) 20° Fahrenheit
3) 154° Celsius
4) 154° Fahrenheit

75 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) $P(x) = -0.5x^2 + 500x + 350$

76 The formula for the area of a trapezoid is
$A = \dfrac{1}{2}h(b_1 + b_2)$. 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.

77 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

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

15

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

80 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.
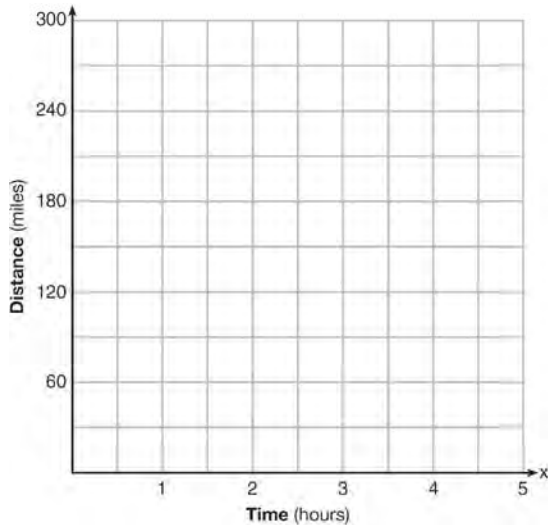
81 If $f(x) = \dfrac{\sqrt{2x+3}}{6x-5}$, then $f\left(\dfrac{1}{2}\right) =$
1) 1
2) -2
3) -1
4) $-\dfrac{13}{3}$

82 Let $f(x) = -2x^2$ and $g(x) = 2x - 4$. On the set of axes below, draw the graphs of $y = f(x)$ and $y = g(x)$.
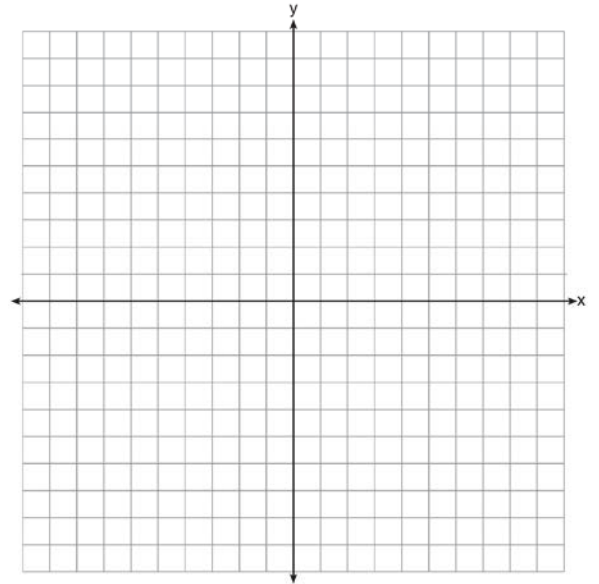
Using this graph, determine and state *all* values of x for which $f(x) = g(x)$.

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

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

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

16

84 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?
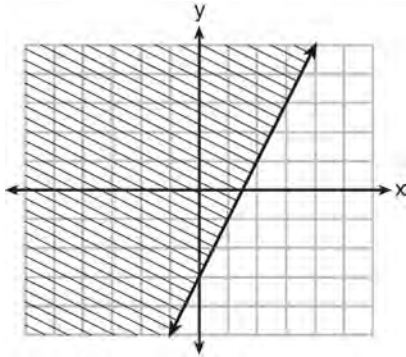1) mean A < mean B
   standard deviation A > standard deviation B
2) mean A > mean B
   standard deviation A < standard deviation B
3) mean A < mean B
   standard deviation A < standard deviation B
4) mean A > mean B
   standard deviation A > standard deviation B

85 Which inequality is represented by the graph below?

1) $y \le 2x - 3$
2) $y \ge 2x - 3$
3) $y \le -3x + 2$
4) $y \ge -3x + 2$

86 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.

87 What is the value of x in the equation $\dfrac{x-2}{3} + \dfrac{1}{6} = \dfrac{5}{6}$?
1) 4
2) 6
3) 8
4) 11

88 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.

89 Which situation could be modeled by using a linear function?
1) a bank account balance that grows at a rate of 5% per year, compounded annually
2) a population of bacteria that doubles every 4.5 hours
3) the cost of cell phone service that charges a base amount plus 20 cents per minute
4) the concentration of medicine in a person's body that decays by a factor of one-third every hour

90 The graph of the equation $y = ax^2$ is shown below.
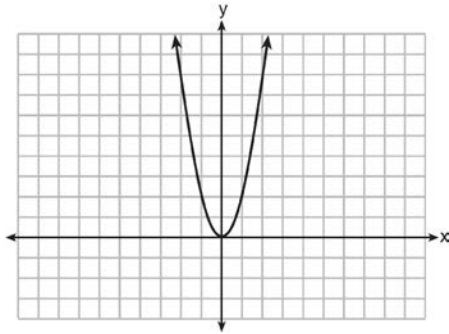
If a is multiplied by $-\dfrac{1}{2}$, the graph of the new equation is
1)   wider and opens downward
2)   wider and opens upward
3)   narrower and opens downward
4)   narrower and opens upward

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

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

Which ratio is *incorrectly* written to convert his speed?
1) $\dfrac{3\ \text{ft}}{1\ \text{yd}}$
2) $\dfrac{5280\ \text{ft}}{1\ \text{mi}}$
3) $\dfrac{60\ \text{sec}}{1\ \text{min}}$
4) $\dfrac{60\ \text{min}}{1\ \text{hr}}$

92 Which expression is equivalent to $2(3g - 4) - (8g + 3)$?
1) $-2g - 1$
2) $-2g - 5$
3) $-2g - 7$
4) $-2g - 11$

93 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.

94 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) $f(1) = 4$
     $f(x) = 10f(x - 1)$

95 Which table of values represents a linear relationship?

1)

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

2)

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

3)

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

4)

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

96 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 nth term of this sequence?
1) $a_n = 8n + 10$
2) $a_n = 8n - 14$
3) $a_n = 16n + 10$
4) $a_n = 16n - 38$

97 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) $(2, 9)$

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

99 The table below shows the number of grams of carbohydrates, x, and the number of Calories, y, of six different foods.

| Carbohydrates (x)	Calories (y)
8	120
9.5	138
10	147
6	88
7	108
4	62

Which equation best represents the line of best fit for this set of data?
1) $y = 15x$
2) $y = 0.07x$
3) $y = 0.1x - 0.4$
4) $y = 14.1x + 5.8$

19

100 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

101 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

102 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.
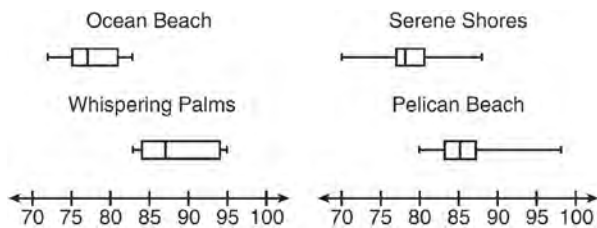
Which destination has a median temperature above 80 degrees and the smallest interquartile range?
1) Ocean Beach
2) Whispering Palms
3) Serene Shores
4) Pelican Beach

103 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

104 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

105 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

106 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

107 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) $8x^3 + 2x^2 + 3x + 18$

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

109 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) $8x + 4y = 44$
   $-8x + 8y = -8$

110 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.

111 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%

112 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.

21

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

114 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*.

115 If $f(x) = x^2 - 2x - 8$ and $g(x) = \frac{1}{4}x - 1$, for which value 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

116 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.

117 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) $(2x+3)(x-1) = 0$

118 Shawn incorrectly graphed the inequality $-x - 2y \geq 8$ as shown below.
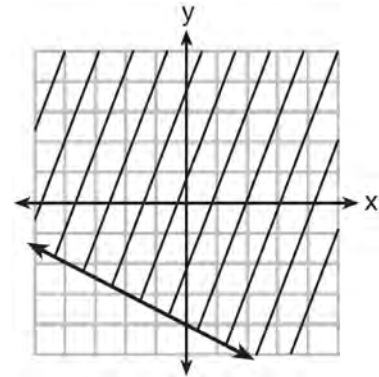
Explain Shawn's mistake. Graph the inequality correctly on the set of axes below.
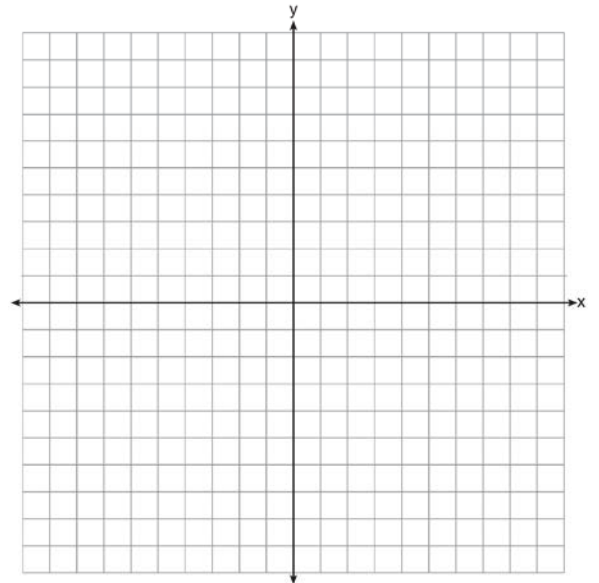
119 Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths, x. Which equation could be used to determine x?
1) $(10+x)(12+x) = 120$
2) $(10+x)(12+x) = 180$
3) $(15+x)(18+x) = 180$
4) $(15)(18) = 120 + x^2$

120 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.

121 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

122 Solve for x algebraically:
$7x - 3(4x - 8) \le 6x + 12 - 9x$
If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

123 Solve the inequality below to determine and state the smallest possible value for x in the solution set.
$$3(x + 3) \le 5x - 3$$

124 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?
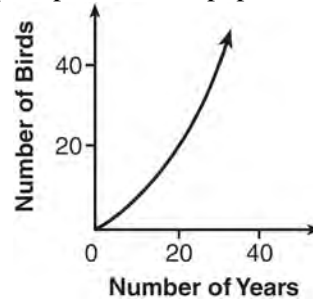
1)
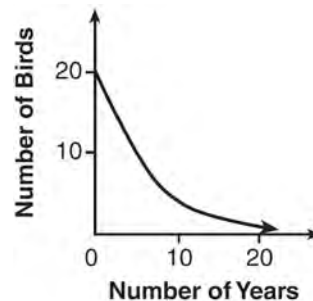
2)

3)

4)

125 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) $-7 \pm \sqrt{3}$

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

127 Which function defines the sequence $-6, -10, -14, -18, \ldots$, where $f(6) = -26$?

1) $f(x) = -4x - 2$
2) $f(x) = 4x - 2$
3) $f(x) = -x + 32$
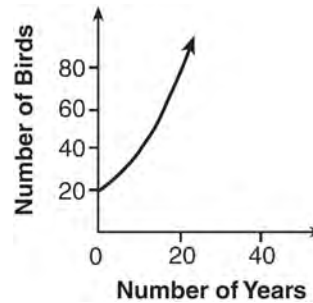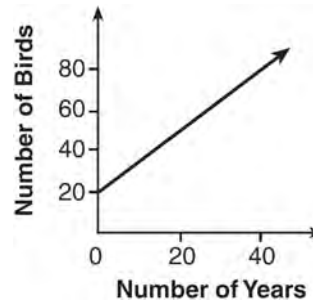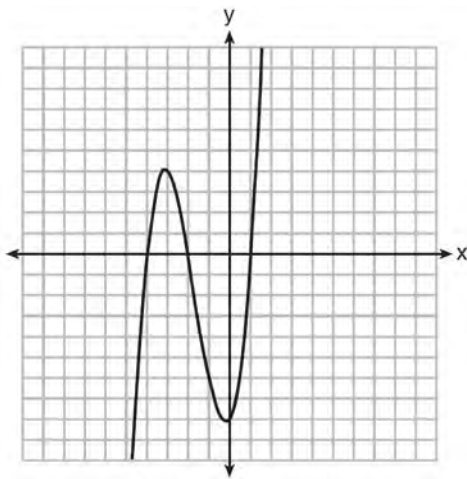4) $f(x) = x - 26$

128 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.*

129 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) $(x^2 + 6)(x^2 - 6)$

130 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 nth pattern? Explain your answer.

131 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.

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

133 Which graph represents the solution of $y \le x + 3$ and $y \ge -2x - 2$?

1)

2)

3)

4)
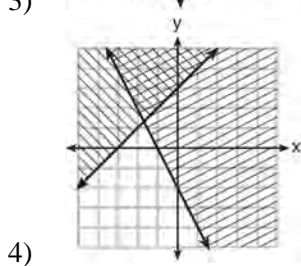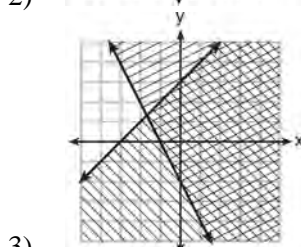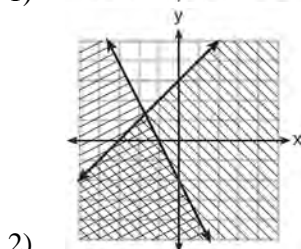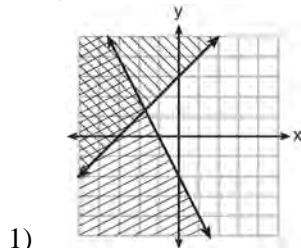
134 Ms. Fox asked her class "Is the sum of 4.2 and $\sqrt{2}$ rational or irrational?" Patrick answered that the sum would be irrational. State whether Patrick is correct or incorrect. Justify your reasoning.

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

136 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.

137 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)
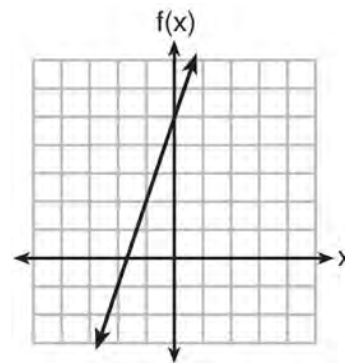
138 The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where x is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?
1) integers
2) positive real numbers
3) positive rational numbers
4) whole numbers

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

1)

x	y
0	2
1	5
2	8
3	11

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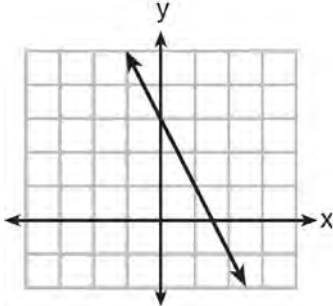
3)

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

140 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.

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

142 Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1 V_1 = P_2 V_2$. When the formula is solved for P_2, the result is
1) $P_1 V_1 V_2$
2) $\dfrac{V_2}{P_1 V_1}$
3) $\dfrac{P_1 V_1}{V_2}$
4) $\dfrac{P_1 V_2}{V_1}$

143 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.
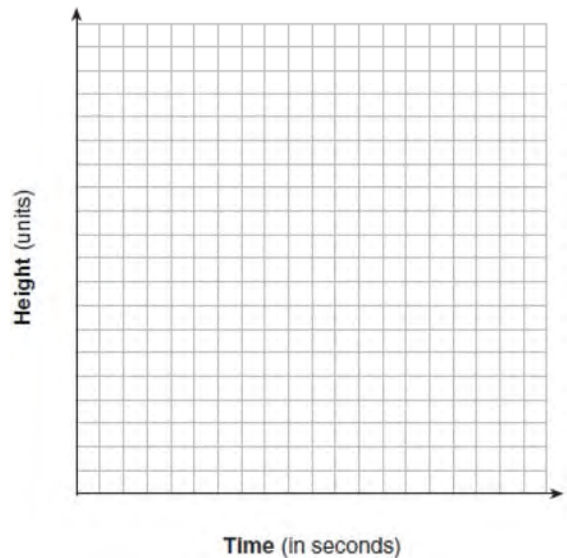
State the coordinates of the vertex and explain its meaning in the context of the problem.

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

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

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

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

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

Which expression best fits the data for $T(m)$?
1) $150(0.85)^m$
2) $150(1.15)^m$
3) $150(0.85)^{m-1}$
4) $150(1.15)^{m-1}$

146 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

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

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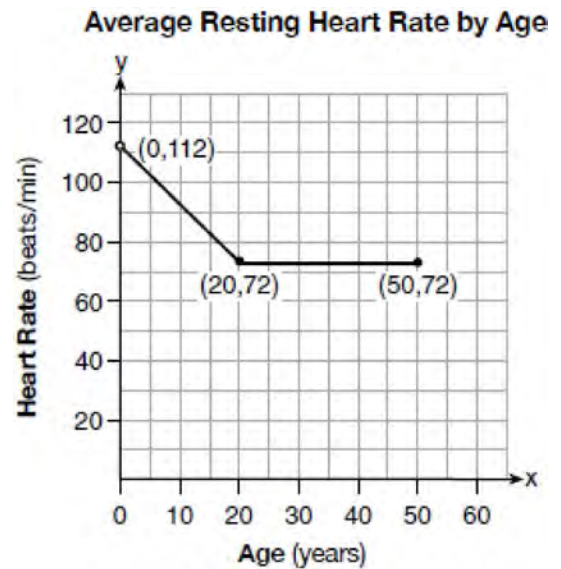
Which statement about average resting heart rates is *not* supported by the graph?
1) A 10-year-old has the same average resting heart rate as a 20-year-old.
2) A 20-year-old has the same average resting heart rate as a 30-year-old.
3) A 40-year-old may have the same average resting heart rate for ten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

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

27

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

x	2	3	3	4	6	7	8	9	9	10
Residual	2	1	−1	−2	−3	−2	−1	2	0	3

Plot these residuals on the set of axes below.
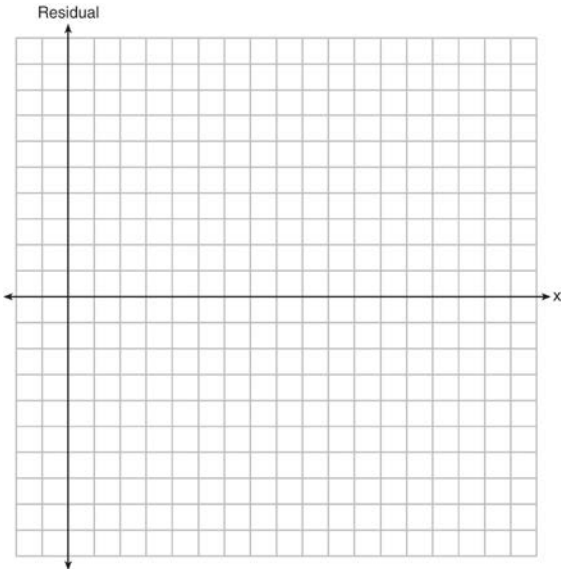
Residual

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

150 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.

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

152 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) $m + f = 3.95$
   $f + 0.005 = m$

153 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

154 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

28

155 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.

156 Isaiah collects data from two different companies, each with four employees. The results of the study, based on each worker's age and salary, are listed in the tables below.

Company 1

Worker's Age in Years	Salary in Dollars
25	30,000
27	32,000
28	35,000
33	38,000

Company 2

Worker's Age in Years	Salary in Dollars
25	29,000
28	35,500
29	37,000
31	65,000

Which statement is true about these data?
1) The median salaries in both companies are greater than $37,000.
2) The mean salary in company 1 is greater than the mean salary in company 2.
3) The salary range in company 2 is greater than the salary range in company 1.
4) The mean age of workers at company 1 is greater than the mean age of workers at company 2.

157 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.
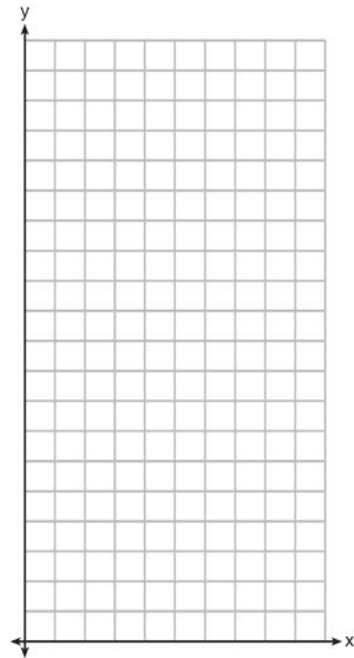
State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

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

29

159 Given the following quadratic functions:
$$g(x) = -x^2 - x + 6$$
and

x	-3	-2	-1	0	1	2	3	4	5
n(x)	-7	0	5	8	9	8	5	0	-7

Which statement about these functions is true?
1) Over the interval $-1 \leq x \leq 1$, the average rate of change for $n(x)$ is less than that for $g(x)$.
2) The y-intercept of $g(x)$ is greater than the y-intercept for $n(x)$.
3) The function $g(x)$ has a greater maximum value than $n(x)$.
4) The sum of the roots of $n(x) = 0$ is greater than the sum of the roots of $g(x) = 0$.

160 Given the following expressions:

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

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

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

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

162 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.

163 Which function is shown in the table below?

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

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

164 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.

165 The graph of $y = f(x)$ is shown below.
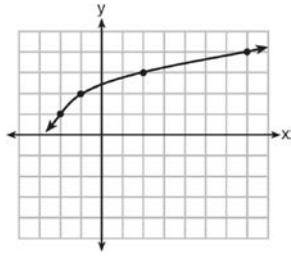
What is the graph of $y = f(x+1) - 2$?
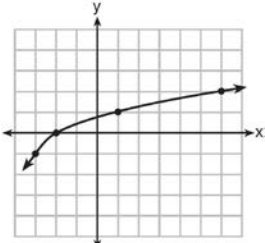
1)
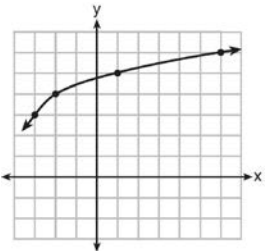
2)
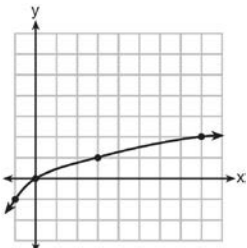
3)
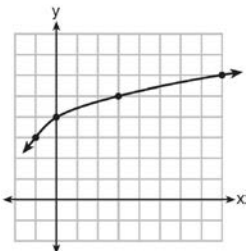
4)

166 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 $-a$

167 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.

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

31
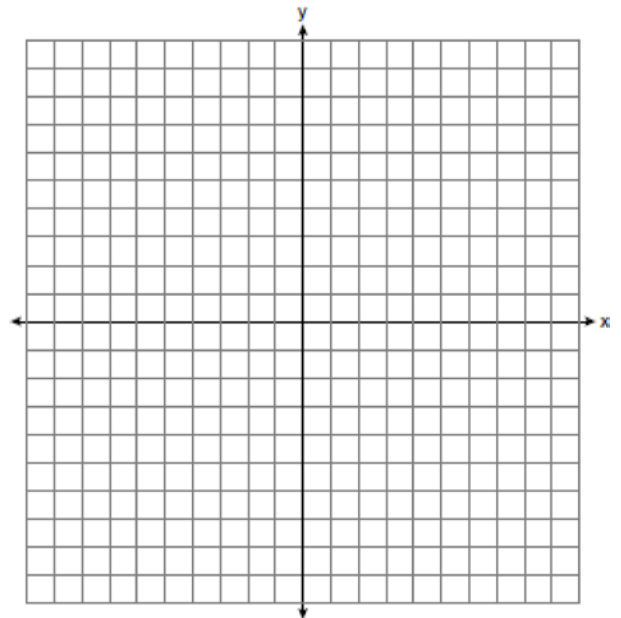
169 Find the zeros of $f(x) = (x-3)^2 - 49$, algebraically.

170 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.
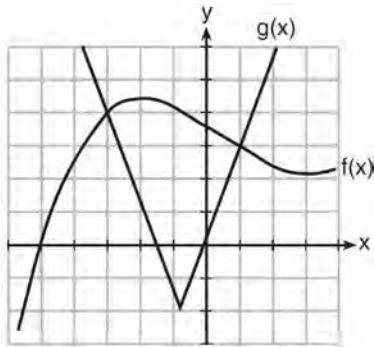
171 Sandy programmed a website's checkout process with an equation to calculate the amount customers will be charged when they download songs. The website offers a discount. If one song is bought at the full price of $1.29, then each additional song is $.99. State an equation that represents the cost, 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.

172 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.

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

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

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

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

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

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

175 A satellite television company charges a one-time installation fee and a monthly service charge. The total cost is modeled by the function $y = 40 + 90x$. Which statement represents the meaning of each part of the function?
1) y is the total cost, x is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.
2) y is the total cost, x is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
3) x is the total cost, y is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.
4) x is the total cost, y is the number of months of service, $90 is the installation fee, and $40 is the service charge per month.

32

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

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

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

177 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.

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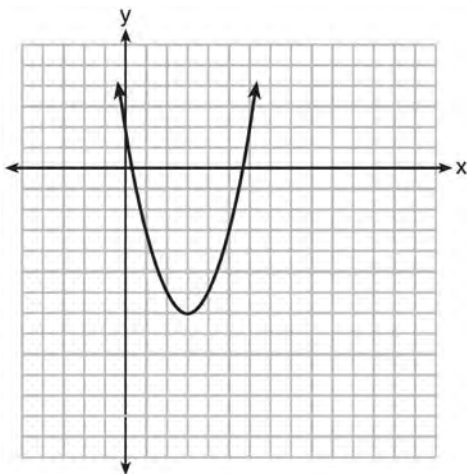
Which function has a minimum that is *less* than the one shown in the graph?
1) $y = x^2 - 6x + 7$
2) $y = |x + 3| - 6$
3) $y = x^2 - 2x - 10$
4) $y = |x - 8| + 2$

179 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.
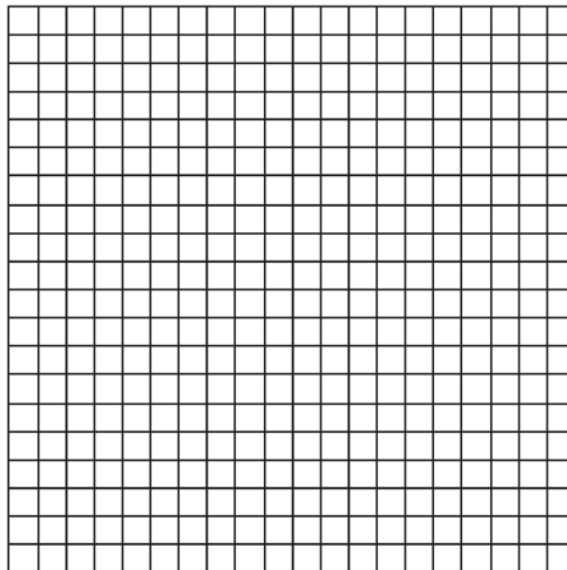
180 Andy has $310 in his account. Each week, w, he withdraws $30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?
1) $310 - 8w$
2) $280 + 30(w - 1)$
3) $310w - 30$
4) $280 - 30(w - 1)$

181 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.

33

182 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

183 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.

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

185 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) $24 - 12x = 60$

186 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.

187 The graph below shows the distance in miles, m, hiked from a camp in h hours.
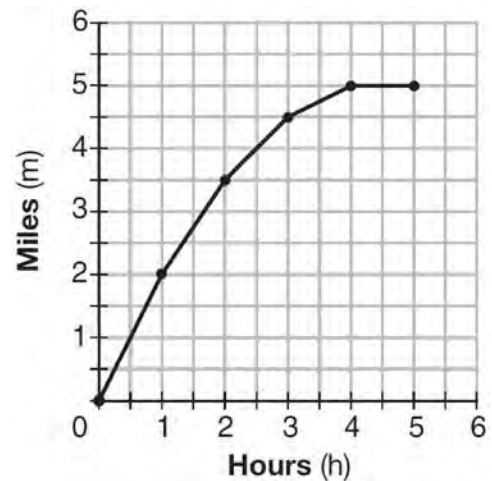
Which hourly interval had the greatest rate of change?
1) hour 0 to hour 1
2) hour 1 to hour 2
3) hour 2 to hour 3
4) hour 3 to hour 4

188 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.

189 The method of completing the square was used to solve the equation $2x^2 - 12x + 6 = 0$. Which equation is a correct step when using this method?

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

190 A polynomial function contains the factors x, $x-2$, and $x+5$. Which graph(s) below could represent the graph of this function?
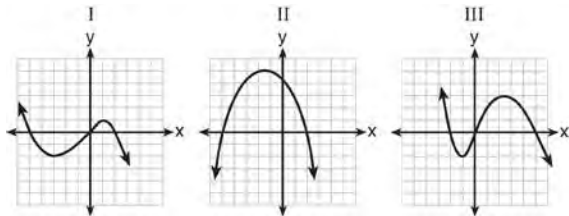
1) I, only
2) II, only
3) I and III
4) I, II, and III

191 How does the graph of $f(x) = 3(x-2)^2 + 1$ compare to the graph of $g(x) = x^2$?

1) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
2) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.
3) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
4) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

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

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

35
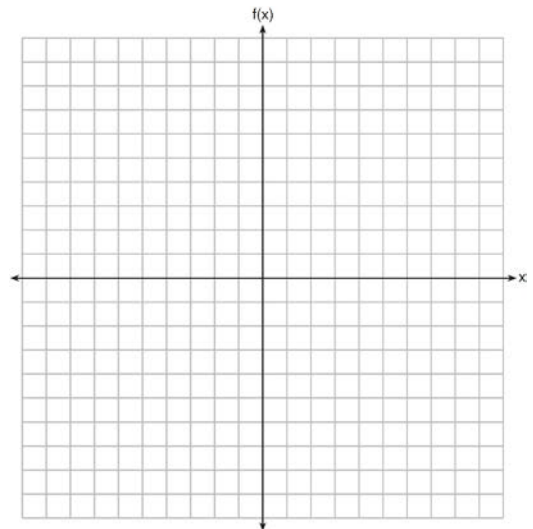
193 The height of a rocket, at selected times, is shown in the table below.

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

Based on these data, which statement is *not* a valid conclusion?
1) The rocket was launched from a height of 180 feet.
2) The maximum height of the rocket occurred 3 seconds after launch.
3) The rocket was in the air approximately 6 seconds before hitting the ground.
4) The rocket was above 300 feet for approximately 2 seconds.

194 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

195 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) $(-3, 2)$

196 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

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

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

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

36

200 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.

201 What is one point that lies in the solution set of the system of inequalities graphed below?
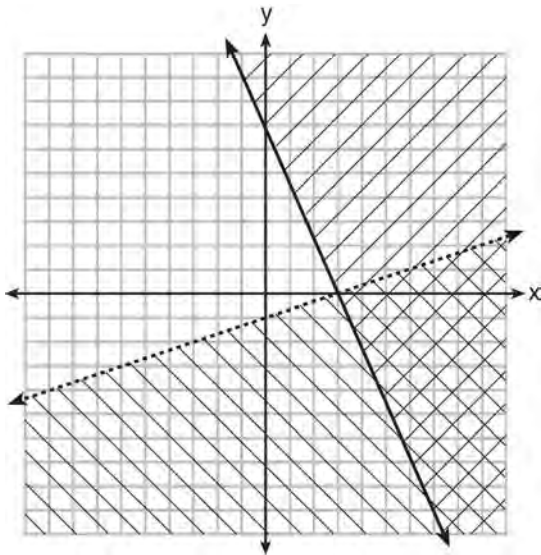
1) (7,0)
2) (3,0)
3) (0,7)
4) (−3,5)

202 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.

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

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

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

204 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.

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

206 Which point is *not* on the graph represented by
  $y = x^2 + 3x - 6$?
  1) $(-6, 12)$
  2) $(-4, -2)$
  3) $(2, 4)$
  4) $(3, -6)$

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

208 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) $2(9x + 25)(9x - 25)$

209 Nancy works for a company that offers two types of savings plans. Plan A is represented on the graph below.
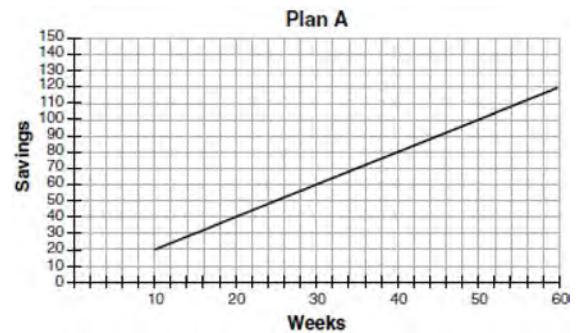
Plan B is represented by the function $f(x) = 0.01 + 0.05x^2$, where x is the number of weeks. Nancy wants to have the highest savings possible after a year. Nancy picks Plan B. Her decision is
  1) correct, because Plan B is an exponential function and will increase at a faster rate
  2) correct, because 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

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

38

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

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

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

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

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

212 Which function has the same y-intercept as the graph below?
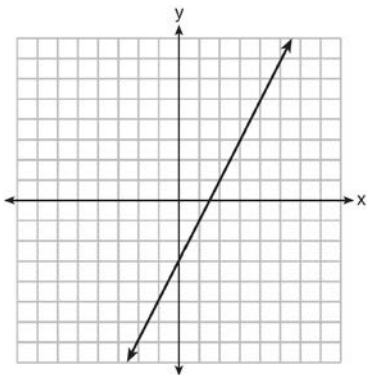
1) $y = \dfrac{12 - 6x}{4}$

2) $27 + 3y = 6x$

3) $6y + x = 18$

4) $y + 3 = 6x$

213 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.

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

215 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.
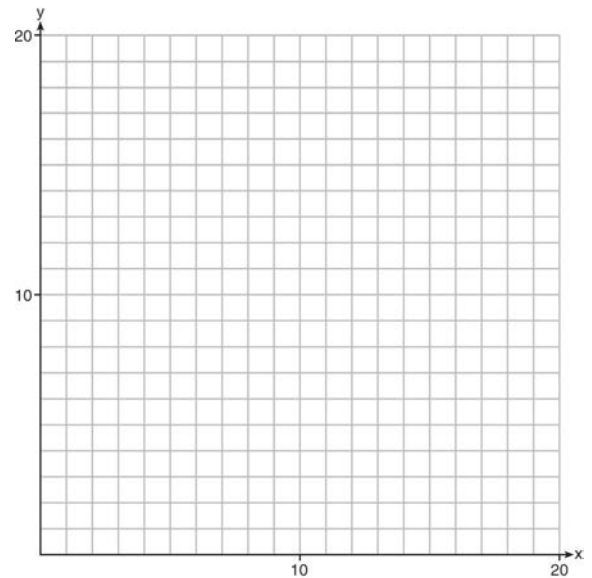
Determine and state one combination of hours that will allow Edith to earn *at least* $80 per week while working *no more than* 15 hours.

216 Let f be the function represented by the graph below.
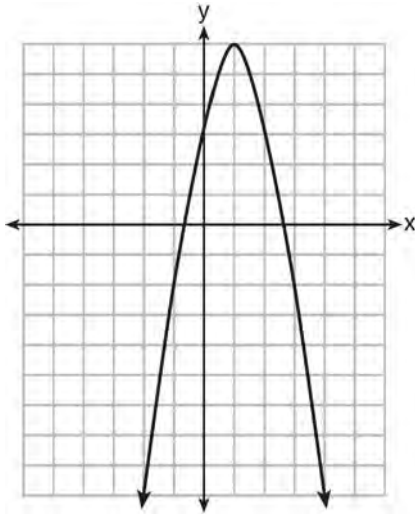
Let g be a function such that $g(x) = -\frac{1}{2}x^2 + 4x + 3$.

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

217 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) $x + 2y = 5$
    $4x + 2y = 12$

218 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.
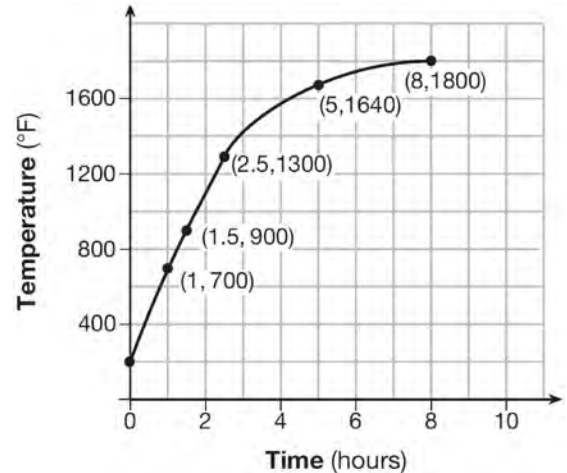
During which time interval did the temperature in the kiln show the greatest average rate of change?
1) 0 to 1 hour
2) 1 hour to 1.5 hours
3) 2.5 hours to 5 hours
4) 5 hours to 8 hours

219 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

220 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.

221 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

222 A family is traveling from their home to a vacation resort hotel. The table below shows their distance from home as a function of time.

Time (hrs)	0	2	5	7
Distance (mi)	0	140	375	480

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

223 On the axes below, graph $f(x) = |3x|$.
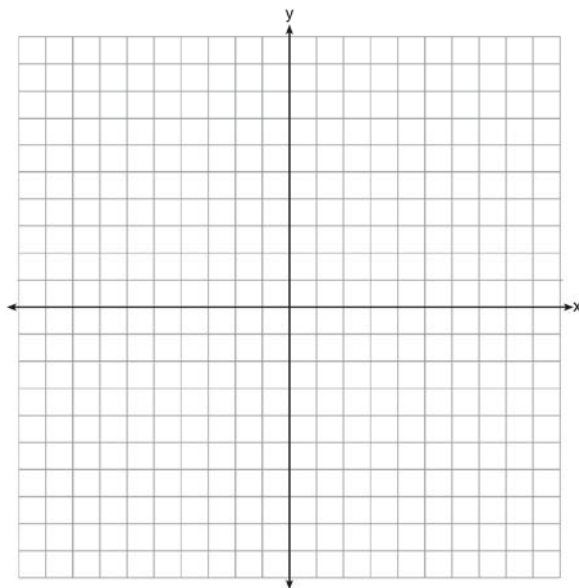
If $g(x) = f(x) - 2$, how is the graph of $f(x)$ translated to form the graph of $g(x)$? If $h(x) = f(x - 4)$, how is the graph of $f(x)$ translated to form the graph of $h(x)$?

Algebra I Common Core State Standards Regents at Random

224 The graph below represents a jogger's speed during her 20-minute jog around her neighborhood.
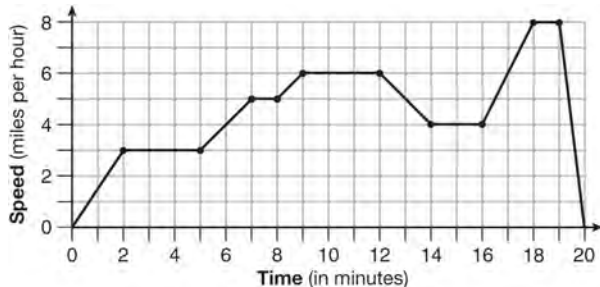
Which statement best describes what the jogger was doing during the $9 - 12$ minute interval of her jog?
1) She was standing still.
2) She was increasing her speed.
3) She was decreasing her speed.
4) She was jogging at a constant rate.

225 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.

226 Which table represents a function?

1)

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

2)

x	0	−1	0	1
f(x)	0	1	−1	0

3)

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

4)

x	0	1	−1	0
f(x)	0	−1	0	1

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

228 Given: $y+x>2$

$$y \le 3x-2$$

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

1)

2)

3)

4)

229 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2, -1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x - 2)$. Explain how you arrived at your answer. [The use of the set of axes below is optional.]
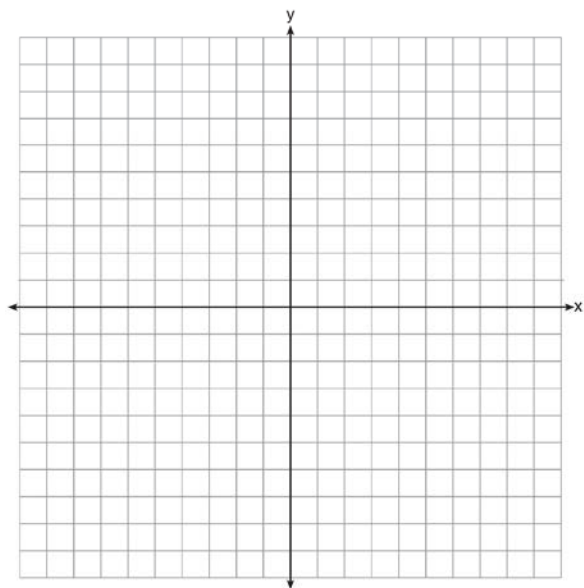
230 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

231 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

232 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.

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

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

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

Equation: _____

Create a residual plot on the axes below, using the residual scores in the table above.
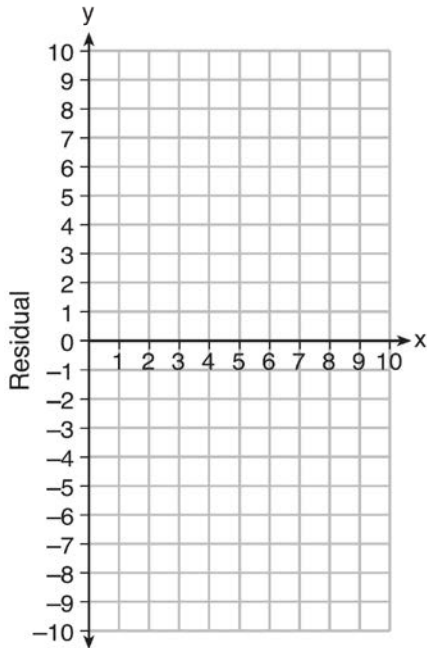
Based on the residual plot, state whether the equation is a good fit for the data. Justify your answer.

235 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) $f(x) = (x-5)(x-6)$

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

237 Which inequality is represented in the graph below?
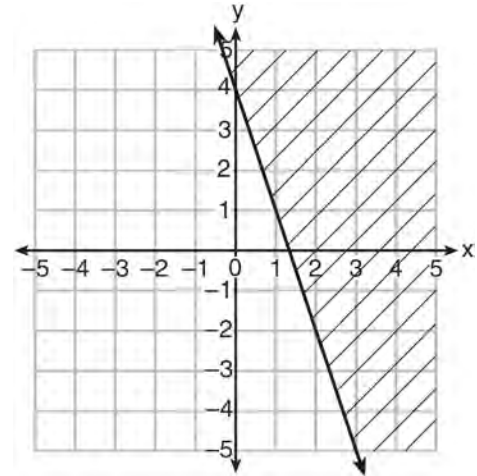
1) $y \geq -3x + 4$
2) $y \leq -3x + 4$
3) $y \geq -4x - 3$
4) $y \leq -4x - 3$

238 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

239 If $A = 3x^2 + 5x - 6$ and $B = -2x^2 - 6x + 7$, then $A - B$ equals
1) $-5x^2 - 11x + 13$
2) $5x^2 + 11x - 13$
3) $-5x^2 - x + 1$
4) $5x^2 - x + 1$

240 The graph of the function $f(x) = \sqrt{x+4}$ is shown below.
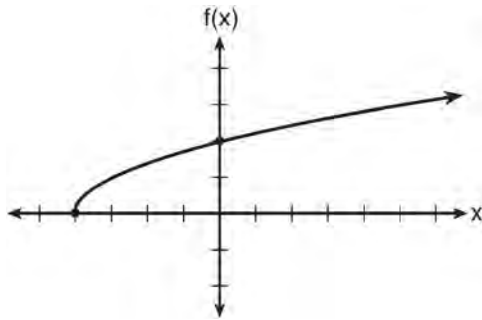
The domain of the function is
1) $\{x \mid x > 0\}$
2) $\{x \mid x \geq 0\}$
3) $\{x \mid x > -4\}$
4) $\{x \mid x \geq -4\}$

241 On the set of axes below, draw the graph of $y = x^2 - 4x - 1$.
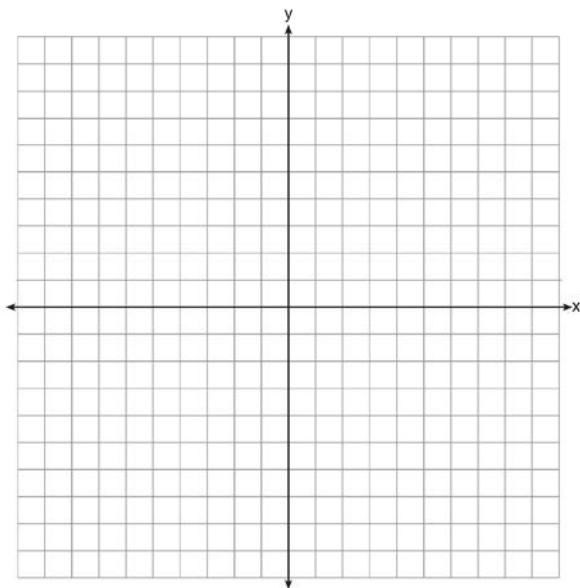
State the equation of the axis of symmetry.

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

243 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.
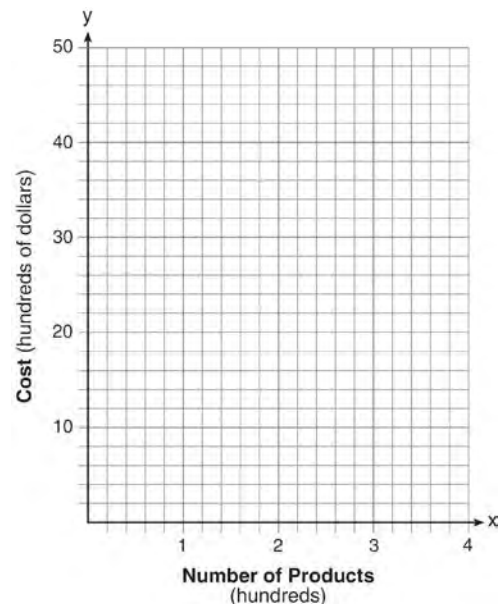
State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer. If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

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

	Sun	Mon	Tues	Wed	Thurs
Week 1	4	3	3.5	2	2
Week 2	4.5	5	2.5	3	1.5
Week 3	4	3	1	1.5	2.5

Using an appropriate scale on the number line below, construct a box plot for the 15 values.

245 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.
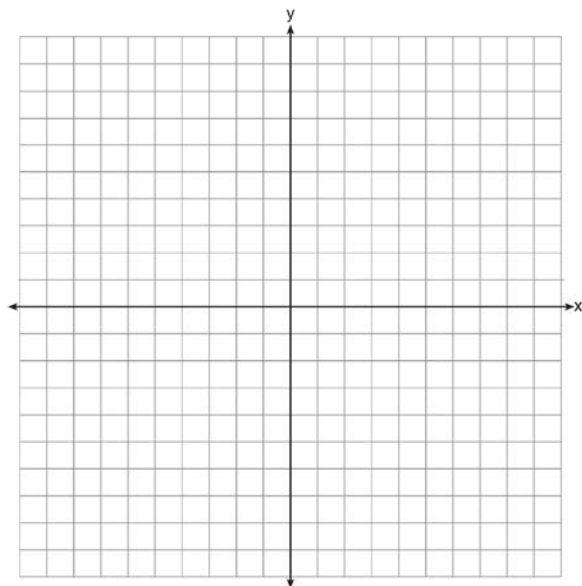
246 An airplane leaves New York City and heads toward Los Angeles. As it climbs, the plane gradually increases its speed until it reaches cruising altitude, at which time it maintains a constant speed for several hours as long as it stays at cruising altitude. After flying for 32 minutes, the plane reaches 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.

247 A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, y, of the ball from the ground after x seconds.
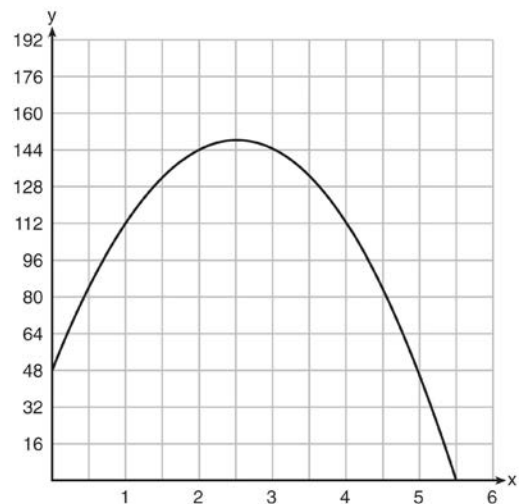
For which interval is the ball's height always *decreasing*?
1) $0 \le x \le 2.5$
2) $0 < x < 5.5$
3) $2.5 < x < 5.5$
4) $x \ge 2$

248 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

249 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.

250 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) $(x^4 + y)(x - 9y)$

251 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

252 When directed to solve a quadratic equation by completing the square, Sam arrived at the equation $\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$. Which equation could have been the original equation given to Sam?
1) $x^2 + 5x + 7 = 0$
2) $x^2 + 5x + 3 = 0$
3) $x^2 - 5x + 7 = 0$
4) $x^2 - 5x + 3 = 0$

253 Factor the expression $x^4 + 6x^2 - 7$ completely.

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

Number of Weeks	1	2	3	4
Number of Downloads	120	180	270	405

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

255 The dot plot shown below represents the number of pets owned by students in a class.
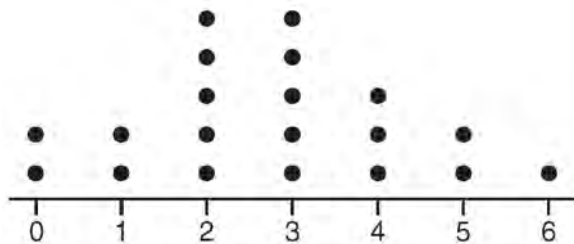
Which statement about the data is *not* true?
1) The median is 3.
2) The interquartile range is 2.
3) The mean is 3.
4) The data contain no outliers.

256 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) $x = -4 \pm 2\sqrt{2}$

257 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.

258 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.

259 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

48

260 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) $c = 60 + 0.05d$

261 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?

262 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

263 If $f(x) = \frac{1}{3}x + 9$, which statement is always true?
1) $f(x) < 0$
2) $f(x) > 0$
3) If $x < 0$, then $f(x) < 0$.
4) If $x > 0$, then $f(x) > 0$.

264 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) $-3 \pm 4\sqrt{14}$

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

Beverly's Cafeteria Study
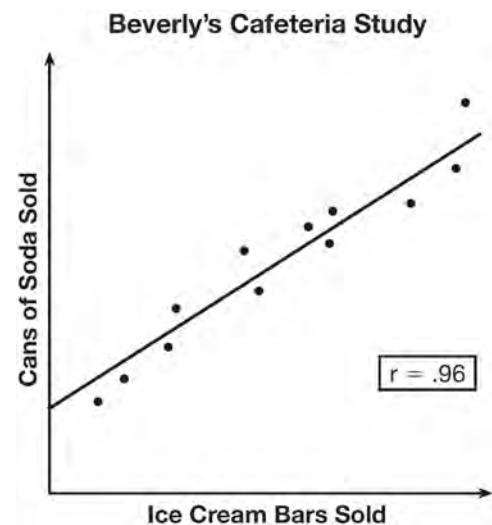
Given this information, which statement(s) can correctly be concluded?
I. Eating more ice cream causes a person to become thirsty.
II. Drinking more soda causes a person to become hungry.
III. There is a strong correlation between ice cream sales and soda sales.
1) I, only
2) III, only
3) I and III
4) II and III

266 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.
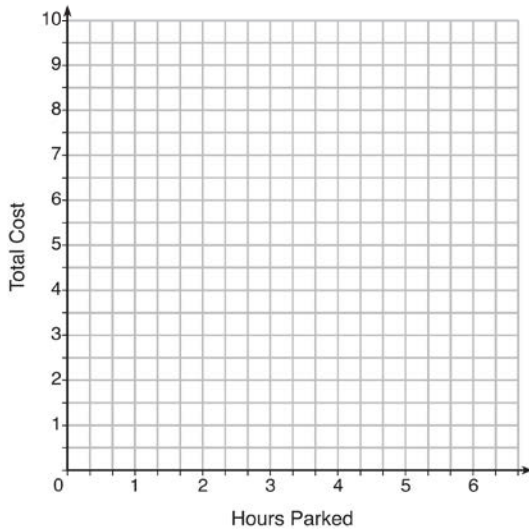
Explain how the cost per hour to park changes over the six-hour period.

267 The formula for the sum of the degree measures of the interior angles of a polygon is $S = 180(n - 2)$. Solve for n, the number of sides of the polygon, in terms of S.

268 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.

269 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?

270 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.

271 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.
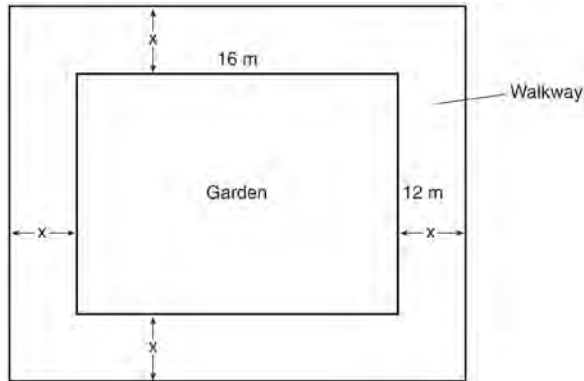
Write an equation that can be used to find x, the width of the walkway. Describe how your equation models the situation. Determine and state the width of the walkway, in meters.

272 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%

273 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.

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

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

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

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

51
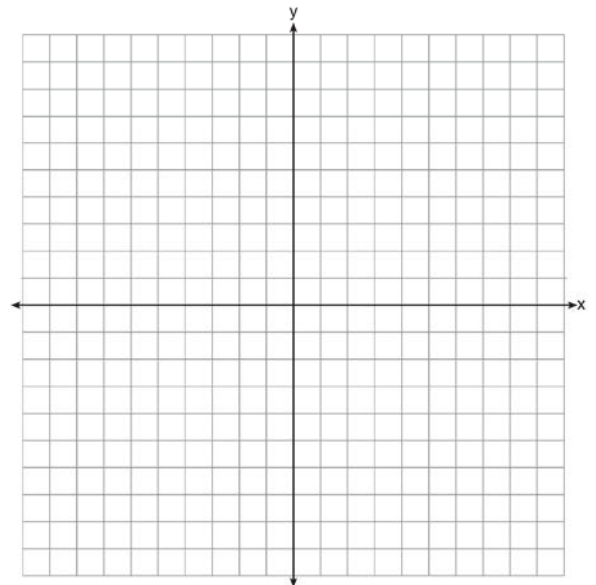
276 Which equation(s) represent the graph below?

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

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

      III $y = (x - 1)(x^2 - 5x - 6)$
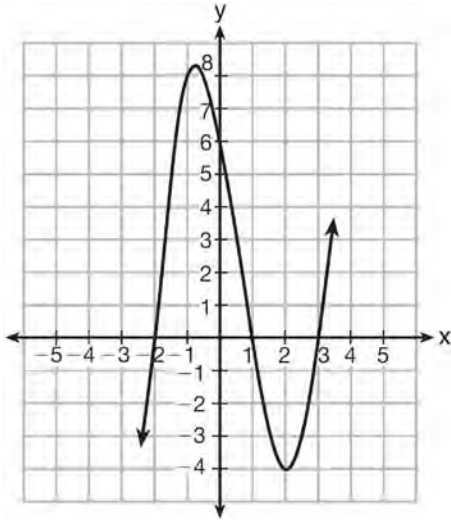
1) I, only
2) II, only
3) I and II
4) II and III

277 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

278 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) $y = x^2 - 10x + 24$

279 A football player attempts to kick a football over a goal post. The path of the football can be modeled by the function $h(x) = -\dfrac{1}{225} x^2 + \dfrac{2}{3} x$, where x is the horizontal distance from the kick, and $h(x)$ is the height of the football above the ground, when both are measured in feet. On the set of axes below, graph the function $y = h(x)$ over the interval $0 \le x \le 150$.
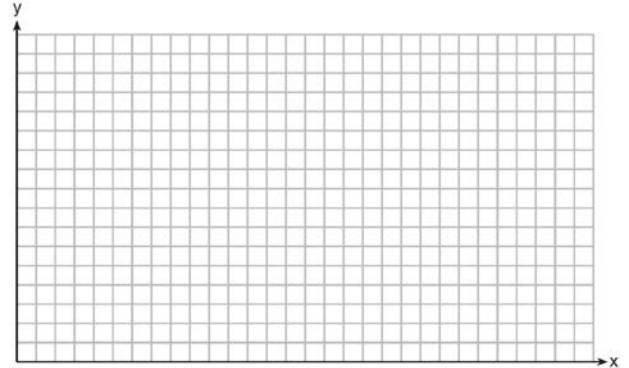
Determine the vertex of $y = h(x)$. Interpret the meaning of this vertex in the context of the problem. The goal post is 10 feet high and 45 yards away from the kick. Will the ball be high enough to pass over the goal post? Justify your answer.

280 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) $-2 \pm 4\sqrt{5}$

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

282 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.
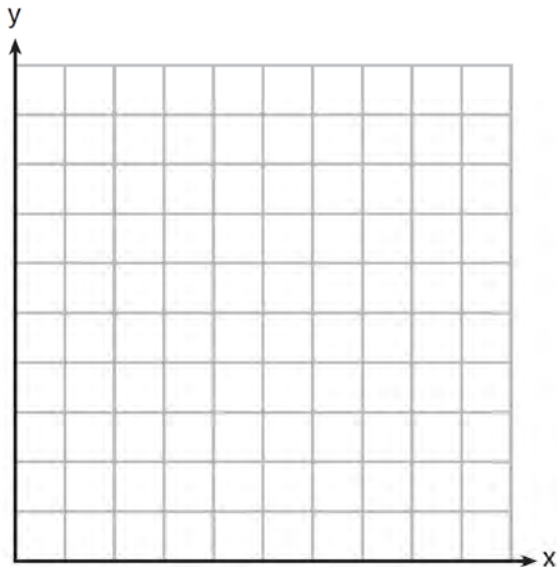
Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution.

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

Popcorn Sales and Soda Sales
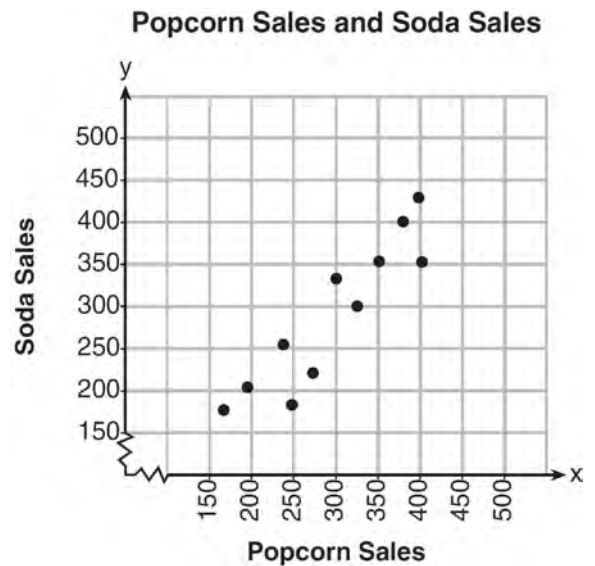
Which conclusion can be drawn from the scatterplot?
1) There is a negative correlation between popcorn sales and soda sales.
2) There is a positive correlation between popcorn sales and soda sales.
3) There is no correlation between popcorn sales and soda sales.
4) Buying popcorn causes people to buy soda.

284 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) $500 + 500(.04) + 520(.04) + 540.8(.04)$

53

285 In the diagram below, $f(x) = x^3 + 2x^2$ is graphed. Also graphed is $g(x)$, the result of a translation of $f(x)$.
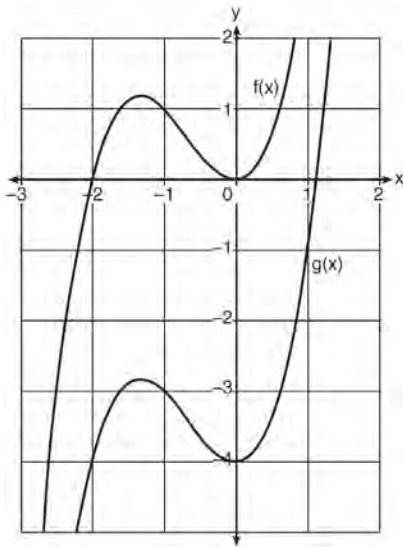
Determine an equation of $g(x)$. Explain your reasoning.

286 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.

287 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
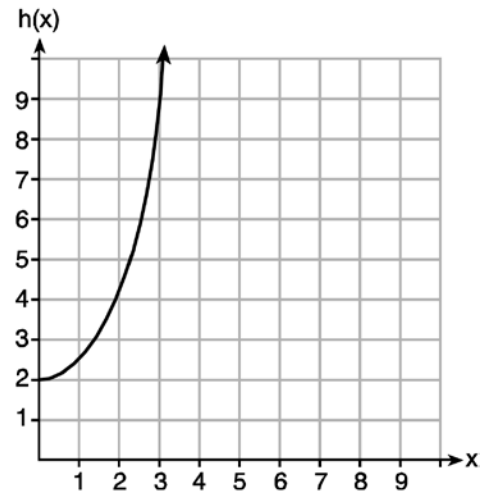
The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \le x \le 3$ is
1) $f(x)$, $g(x)$, $h(x)$
2) $h(x)$, $g(x)$, $f(x)$
3) $g(x)$, $f(x)$, $h(x)$
4) $h(x)$, $f(x)$, $g(x)$

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

289 On the set of axes below, graph the function
$y = |x + 1|$.
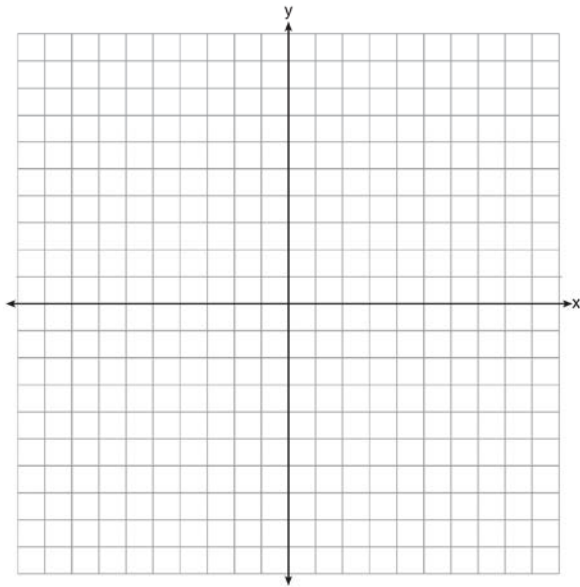
State the range of the function. State the domain over which the function is increasing.

290 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

291 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.

292 A pattern of blocks is shown below.

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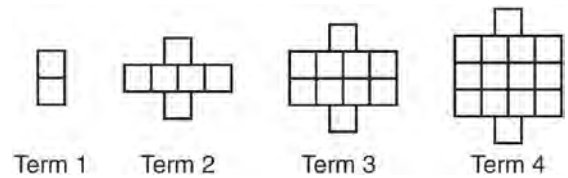
If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the nth term?

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

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

x	y
−5	3.2
−2	3.8
2	4.6
4	5
11	6.4

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

294 An on-line electronics store must sell at least $2500 worth of printers and computers per day. Each printer costs $50 and each computer costs $500. The store can ship a maximum of 15 items per day. On the set of axes below, graph a system of inequalities that models these constraints.

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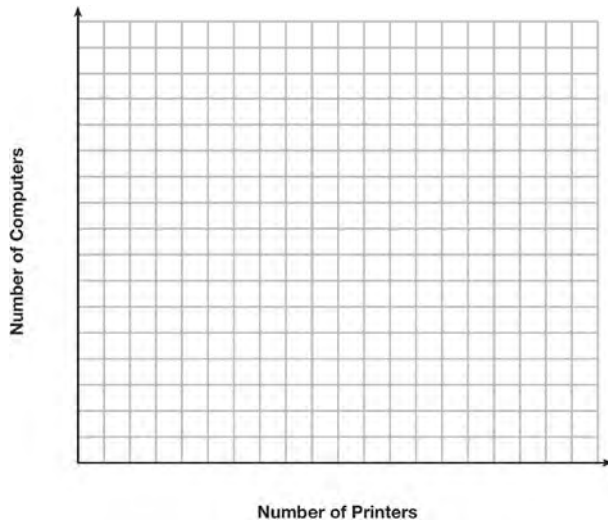
Determine a combination of printers and computers that would allow the electronics store to meet all of the constraints. Explain how you obtained your answer.

295 The length of the shortest side of a right triangle is 8 inches. The lengths of the other two sides are represented by consecutive odd integers. Which equation could be used to find the lengths of the other sides of the triangle?

1) $8^2 + (x+1) = x^2$
2) $x^2 + 8^2 = (x+1)^2$
3) $8^2 + (x+2) = x^2$
4) $x^2 + 8^2 = (x+2)^2$

296 Which quadratic function has the largest maximum?

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

x	f(x)
−1	−3
0	5
1	9
2	9
3	5
4	−3

2)

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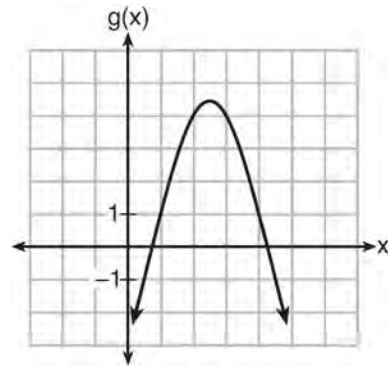
4)

297 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) $7x^5 + 2x^2 + 6$

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

299 What is the correlation coefficient of the linear fit of the data shown below, to the *nearest hundredth*?
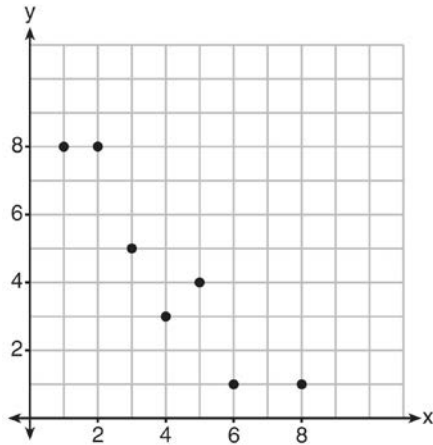
1) 1.00
2) 0.93
3) −0.93
4) −1.00

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

Term 1   Term 2   Term 3
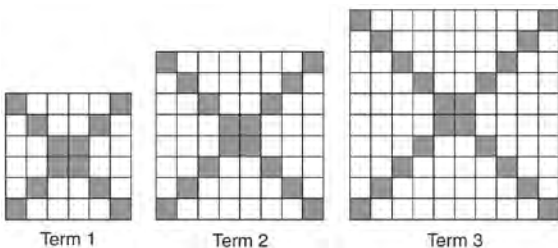
Assuming the pattern continues, which formula determines a_n, the number of shaded squares in the nth term?

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

301 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.

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

303 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*.

304 At an office supply store, if a customer purchases fewer than 10 pencils, the cost of each pencil is $1.75. If a customer purchases 10 or more pencils, the cost of each pencil is $1.25. Let c be a function for which $c(x)$ is the cost of purchasing x pencils, where x is a whole number.

$$c(x) = \begin{cases} 1.75x, & \text{if } 0 \le x \le 9 \\ 1.25x, & \text{if } x \ge 10 \end{cases}$$

Create a graph of c on the axes below.
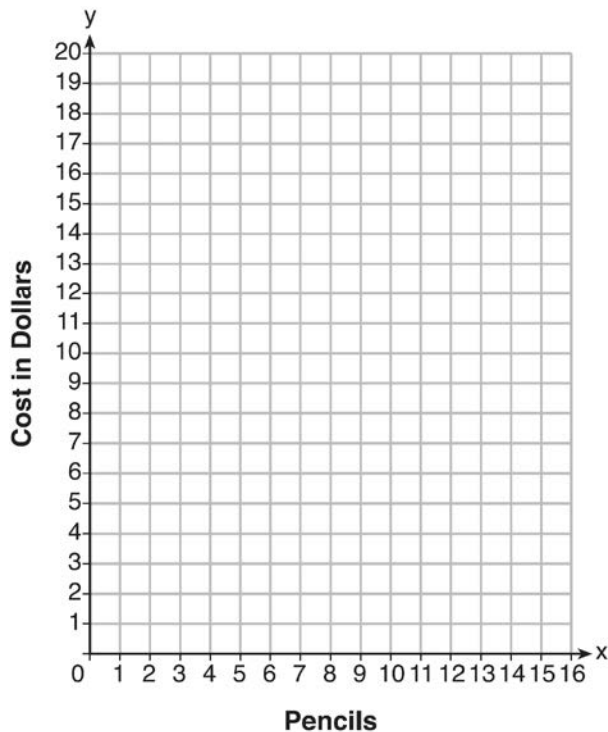
Pencils

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

305 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.

306 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.
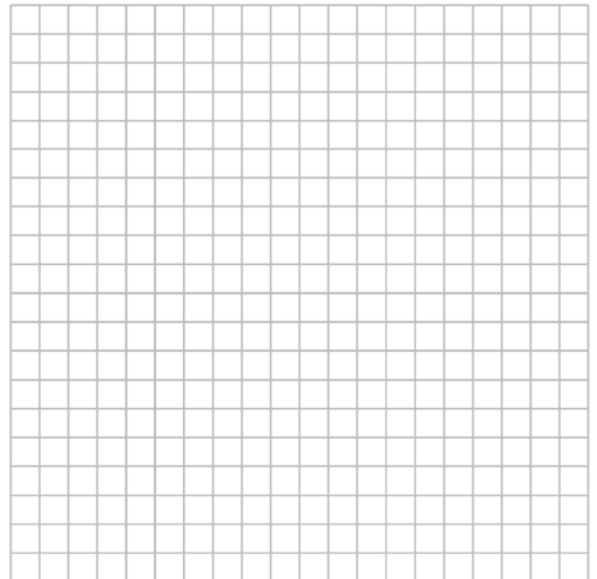
307 Which statistic would indicate that a linear function would *not* be a good fit to model a data set?

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

3)

4)
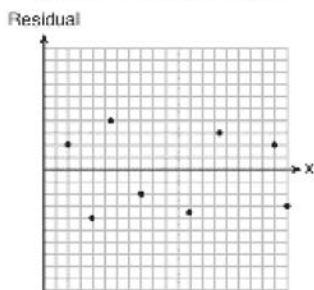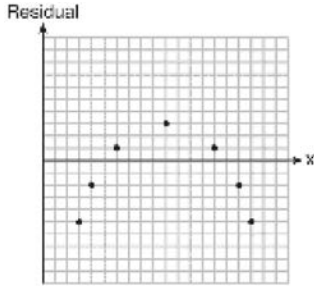
308 Albert says that the two systems of equations shown below have the same solutions.

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.

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

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

For which interval of time was the average rate of change the *smallest*?

1) 2002 - 2004
2) 2003 - 2005
3) 2004 - 2006
4) 2005 - 2007

310 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

311 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

59

312 The residual plots from two different sets of bivariate data are graphed below.
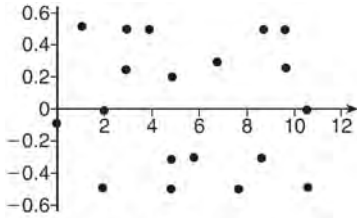
Graph A
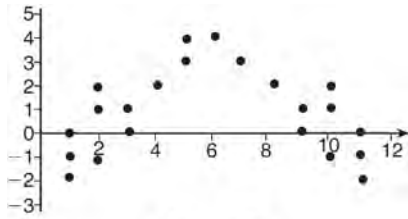
Graph B

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

313 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) $\sqrt{\dfrac{3V}{\pi h}}$

2) $\sqrt{\dfrac{V}{3\pi h}}$

3) $3\sqrt{\dfrac{V}{\pi h}}$

4) $\dfrac{1}{3}\sqrt{\dfrac{V}{\pi h}}$

314 The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.
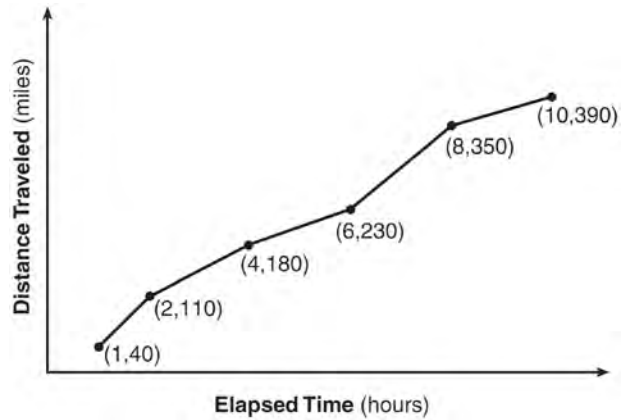
During which interval was their average speed the greatest?
1) the first hour to the second hour
2) the second hour to the fourth hour
3) the sixth hour to the eighth hour
4) the eighth hour to the tenth hour

315 Given: $L = \sqrt{2}$

$M = 3\sqrt{3}$

$N = \sqrt{16}$

$P = \sqrt{9}$

Which expression results in a rational number?
1) $L + M$
2) $M + N$
3) $N + P$
4) $P + L$

316 On the set of axes below, graph

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

and

$$f(x) = \begin{cases} 2x + 1, & x \leq -1 \\ 2 - x^2, & x > -1 \end{cases}$$
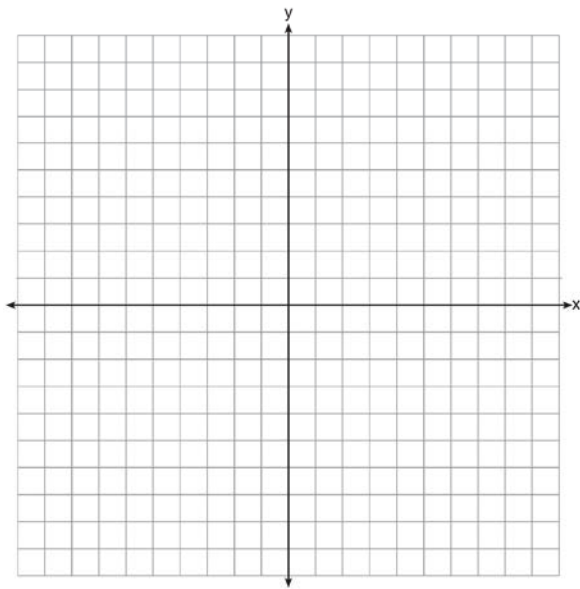
How many values of x satisfy the equation $f(x) = g(x)$? Explain your answer, using evidence from your graphs.

317 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 $x = 3$.

318 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.

319 The table below represents the function F.

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

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

320 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.

61

321 When $3x + 2 \le 5(x - 4)$ is solved for x, the solution is
1) $x \le 3$
2) $x \ge 3$
3) $x \le -11$
4) $x \ge 11$

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

323 The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where a is acceleration due to gravity and t is the amount of time the object has fallen. What is t in terms of a and d?
1) $t = \sqrt{\dfrac{da}{2}}$
2) $t = \sqrt{\dfrac{2d}{a}}$
3) $t = \left(\dfrac{da}{d}\right)^2$
4) $t = \left(\dfrac{2d}{a}\right)^2$

324 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

325 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?

326 Graph the function $y = |x - 3|$ on the set of axes below.
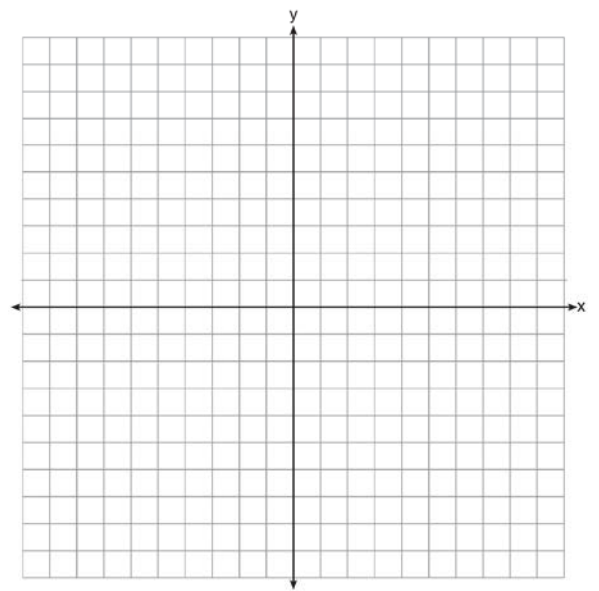
Explain how the graph of $y = |x - 3|$ has changed from the related graph $y = |x|$.

327 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

328 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

329 The sum of two numbers, x and y, is more than 8. When you double x and add it to y, the sum is less than 14. Graph the inequalities that represent this scenario on the set of axes below.
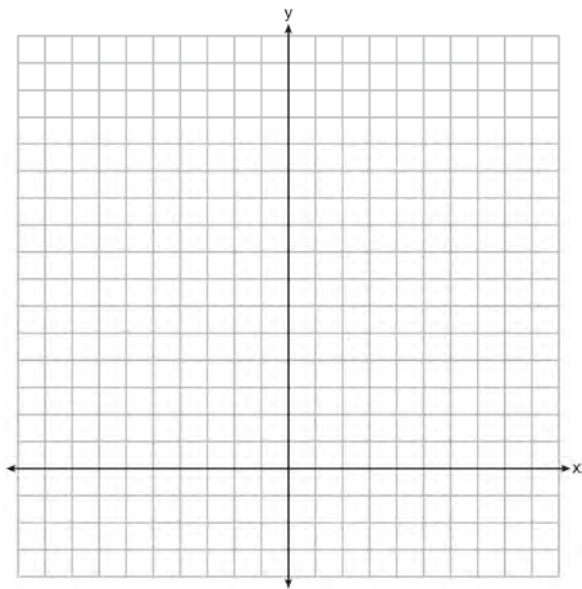
Kai says that the point $(6,2)$ is a solution to this system. Determine if he is correct and explain your reasoning.

330 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.
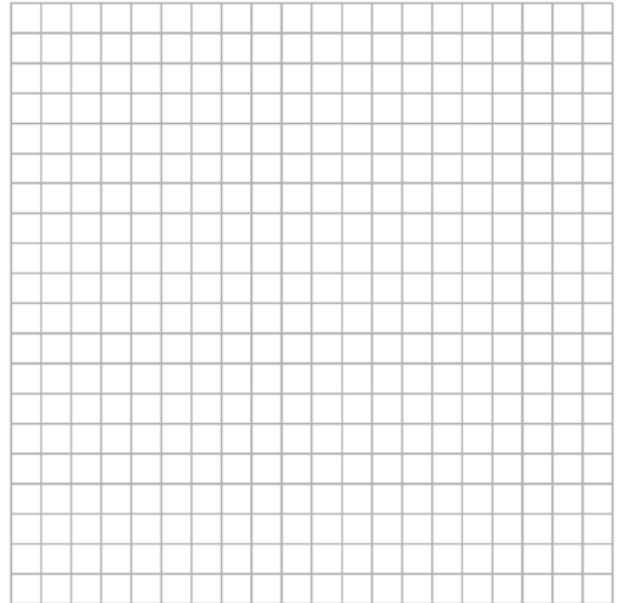
b) If the snowstorm started at 6 p.m., how much snow had accumulated by midnight?

331 Officials in a town use a function, C, to analyze traffic patterns. $C(n)$ represents the rate of traffic through an intersection where n is the number of observed vehicles in a specified time interval. What would be the most appropriate domain for the function?
1) $\{\ldots -2,-1,0,1,2,3,\ldots\}$
2) $\{-2,-1,0,1,2,3\}$
3) $\{0,\frac{1}{2},1,1\frac{1}{2},2,2\frac{1}{2}\}$
4) $\{0,1,2,3,\ldots\}$

332 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) $750 < p < 1500$

333 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?
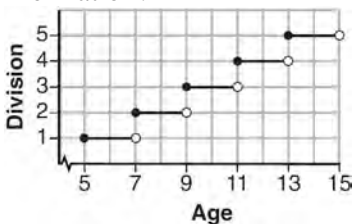
1)
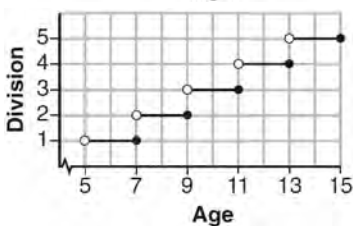
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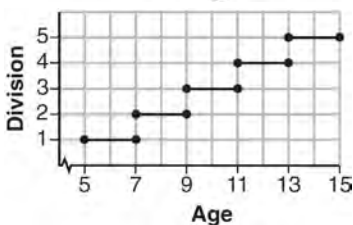
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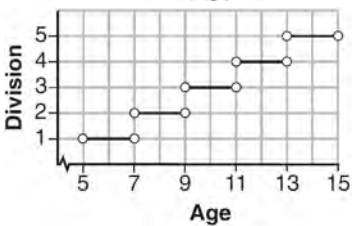
4)

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

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

336 The graph of $y = f(x)$ is shown below.
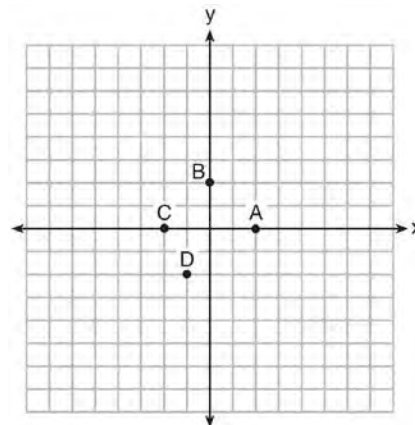
Which point could be used to find $f(2)$?
1) A
2) B
3) C
4) D

337 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.

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

339 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*.)

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

341 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) $9x^2 - 6x + 1 = 5$

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

65

Algebra I CCSS Regents Exam Questions at Random
www.jmap.org

343 Which system of equations has the same solution as the system below?

$$2x + 2y = 16$$
$$3x - y = 4$$

1) $2x + 2y = 16$
    $6x - 2y = 4$
2) $2x + 2y = 16$
    $6x - 2y = 8$
3) $x + y = 16$
    $3x - y = 4$
4) $6x + 6y = 48$
    $6x + 2y = 8$

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

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

346 The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and −3?
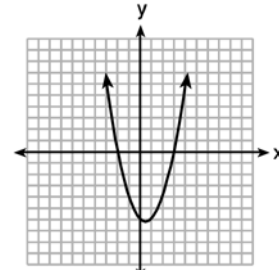
1)
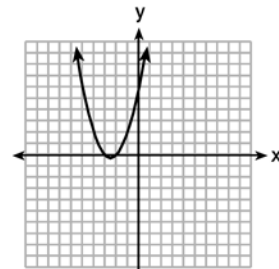
2)
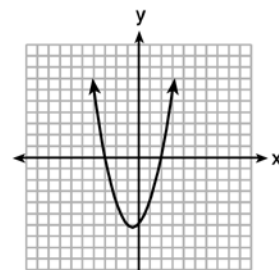
3)
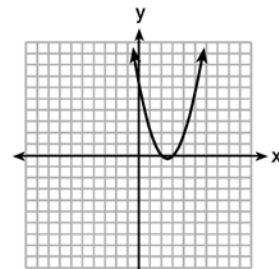
4)

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

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

Which function would accurately model the technician's data?

1) $f(t) = 25^t$
2) $f(t) = 25^{t+1}$
3) $f(t) = 25t$
4) $f(t) = 25(t+1)$

348 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

349 The equation to determine the weekly earnings of an employee at The Hamburger Shack is given by $w(x)$, where x is the number of hours worked.

$$w(x) = \begin{cases} 10x, & 0 \le x \le 40 \\ 15(x - 40) + 400, & x > 40 \end{cases}$$

Determine the difference in salary, *in dollars*, for an employee who works 52 hours versus one who works 38 hours. Determine the number of hours an employee must work in order to earn $445. Explain how you arrived at this answer.

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

x	f(x)
1	12
2	19
3	26
4	33

x	g(x)
1	−1
2	1
3	5
4	13

x	h(x)
1	9
2	12
3	17
4	24

x	k(x)
1	−2
2	4
3	14
4	28

Which table represents a linear function?·

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

351 On the set of axes below, draw the graph of the equation $y = -\dfrac{3}{4}x + 3$.
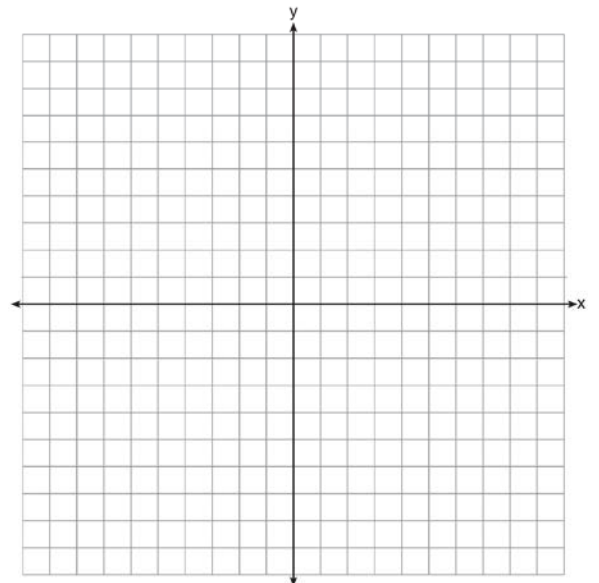
Is the point $(3,2)$ a solution to the equation? Explain your answer based on the graph drawn.

352 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.

353 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

354 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.]

355 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.
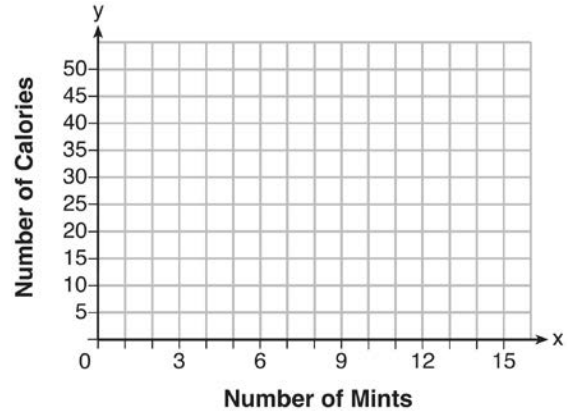
Write an equation that represents $C(x)$. A full box of mints contains 180 Calories. Use the equation to determine the total number of mints in the box.

356 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.
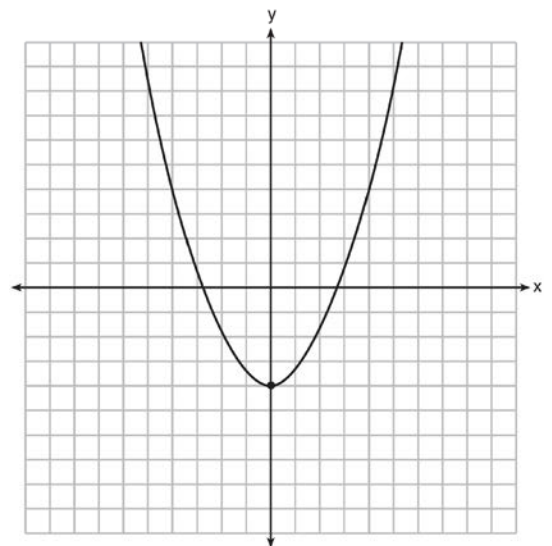
Find the zeros in simplest radical form.

Algebra I Common Core State Standards Regents at Random
Answer Section

1 ANS: 2   PTS: 2   REF: 011602ai   NAT: A.CED.A.2
    TOP: Graphing Linear Functions

2 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
    KEY: AI

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

4 ANS:
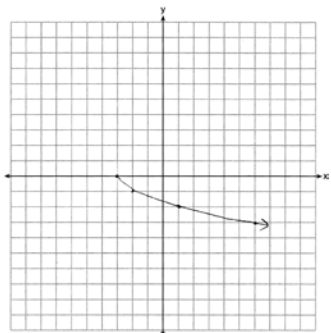
    PTS: 2   REF: 081625ai   NAT: F.IF.C.7   TOP: Graphing Root Functions

5 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

6 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

7 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
    KEY: AI

8 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

9 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: term

10 ANS: 3   PTS: 2   REF: 081609ai   NAT: N.Q.A.2
TOP: Using Rate

11 ANS: 1   PTS: 2   REF: 011708ai   NAT: F.LE.A.2
TOP: Sequences

12 ANS: 4

(1) $\dfrac{6 - 1}{1971 - 1898} = \dfrac{5}{73} \approx .07$ (2) $\dfrac{14 - 6}{1985 - 1971} = \dfrac{8}{14} \approx .57$ (3) $\dfrac{24 - 14}{2006 - 1985} = \dfrac{10}{21} \approx .48$ (4) $\dfrac{35 - 24}{2012 - 2006} = \dfrac{11}{6} \approx 1.83$

PTS: 2   REF: 011613ai   NAT: F.IF.B.6   TOP: Rate of Change
KEY: AI

13 ANS: 4   PTS: 2   REF: 011706ai   NAT: A.APR.B.3
TOP: Zeros of Polynomials

14 ANS:
$T(d) = 2d + 28$ $T(6) = 2(6) + 28 = 40$

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

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

16 ANS: 3
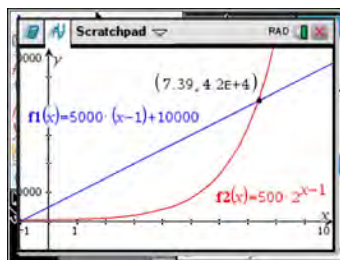
x	$A = 5000(x - 1) + 10000$	$B = 500(2)^{x-1}$
6	35,000	16,000
7	40,000	32,000
8	45,000	64,000
9	50,000	128,000

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

17 ANS:
$y = 17.159x - 2.476.$ $y = 17.159(.65) - 2.476 \approx 8.7$

PTS: 4   REF: 081633ai   NAT: S.ID.B.6   TOP: Regression
KEY: linear

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

19 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

20 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

21 ANS:
No. The sum of a rational and irrational is irrational.

PTS: 2   REF: 011728ai   NAT: N.RN.B.3   TOP: Classifying Numbers

22 ANS: 1

$4x - 5(0) = 40$

$4x = 40$

$x = 10$

PTS: 2   REF: 081408ai   NAT: F.IF.B.4   TOP: Graphing Linear Functions
23 ANS: 3   PTS: 2   REF: 011618ai   NAT: F.LE.A.2
    TOP: Sequences
24 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
25 ANS: 4   PTS: 2   REF: 011608ai   NAT: F.LE.B.5
    TOP: Modeling Exponential Functions
26 ANS: 3

$3(x^2 + 4x + 4) - 12 + 11$

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

PTS: 2   REF: 081621ai   NAT: A.SSE.B.3   TOP: Vertex Form of a Quadratic
27 ANS:

$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16$ None

PTS: 2   REF: 081529ai   NAT: A.REI.B.4   TOP: Using the Discriminant
28 ANS: 3   PTS: 2   REF: 011522ai   NAT: A.SSE.A.2
    TOP: Factoring the Difference of Perfect Squares   KEY: higher power
29 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
30 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

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

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

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

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

                                                                    $10w = 2.4$

                                                                    $w = .24$

PTS: 6   REF: 081637ai   NAT: A.CED.A.3   TOP: Modeling Linear Systems
32 ANS:
No. There are infinite solutions.

PTS: 2   REF: 011725ai   NAT: A.REI.C.6   TOP: Solving Linear Systems
KEY: substitution
33 ANS:
$-2x^2 + 6x + 4$

PTS: 2   REF: 011528ai   NAT: A.APR.A.1   TOP: Operations with Polynomials
KEY: subtraction
34 ANS: 1   PTS: 2   REF: 011615ai   NAT: F.IF.B.5
TOP: Domain and Range
35 ANS: 2   PTS: 2   REF: 081413ai   NAT: A.CED.A.2
TOP: Graphing Linear Functions   KEY: bimodalgraph
36 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
37 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
38 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

39 ANS:

$(2x + 8)(2x + 6) = 100$ The frame has two parts added to each side, so $2x$ must be added to the length and width.

$4x^2 + 28x + 48 = 100$

$x^2 + 7x - 13 = 0$

Multiply length and width to find area and set equal to 100. $x = \dfrac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2(1)} = \dfrac{-7 + \sqrt{101}}{2} \approx 1.5$

PTS: 6   REF: 081537ai   NAT: A.CED.A.1   TOP: Geometric Applications of Quadratics

40 ANS:
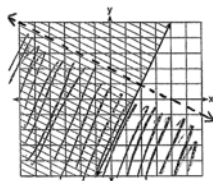
$y \geq 2x - 3$.   Oscar is wrong. $(2) + 2(1) < 4$ is not true.

PTS: 4   REF: 011534ai   NAT: A.REI.D.12   TOP: Graphing Systems of Linear Inequalities
KEY: graph

41 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

42 ANS: 1   PTS: 2   REF: 011623ai   NAT: F.LE.A.1
TOP: Families of Functions

43 ANS:

$-16t^2 + 64t = 0$ $0 \leq t \leq 4$ 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

44 ANS: 2

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

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

$17L = 136$

$L = 8$

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

45 ANS: 4   PTS: 2   REF: 081503ai   NAT: A.SSE.A.1
TOP: Modeling Expressions

46 ANS: 1   PTS: 2   REF: 011504ai   NAT: F.BF.A.1
TOP: Modeling Exponential Functions   KEY: AI

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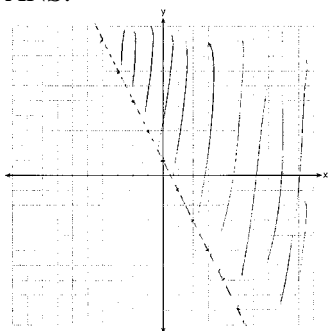
PTS: 2 REF: 081526ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

48 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: S.ID.B.6 TOP: Regression
KEY: exponential

49 ANS: 4 PTS: 2 REF: 011720ai NAT: S.ID.A.2
TOP: Central Tendency and Dispersion

50 ANS: 2 PTS: 2 REF: 011510ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: multiplication

51 ANS:

$x + y \leq 200$ Marta is incorrect because $12.5(30) + 6.25(80) < 1500$

$12.5x + 6.25y \geq 1500$ $375 + 500 < 1500$

                                          $875 < 1500$
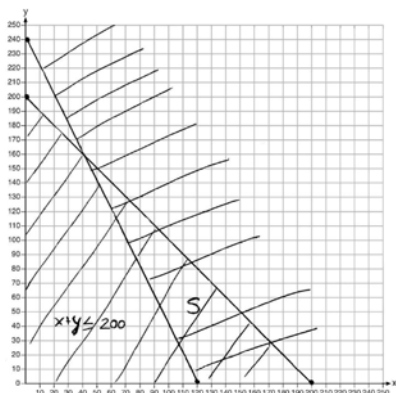
PTS: 6 REF: 011637ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

52 ANS: 1 PTS: 2 REF: 011516ai NAT: A.CED.A.4
TOP: Transforming Formulas

53 ANS: 2 PTS: 2 REF: 081511ai NAT: F.IF.A.1
TOP: Defining Functions KEY: mixed

54 ANS:

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

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

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

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

$\qquad\qquad t = 5$

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

55 ANS:

2 units right and 3 units down.

PTS: 2   REF: 081626ai   NAT: F.BF.B.3   TOP: Graphing Polynomial Functions

56 ANS:

$f(5) = (8) \cdot 2^5 = 256 \qquad f(t) = g(t)$

$g(5) = 2^{5+3} = 256 \qquad (8) \cdot 2^t = 2^{t+3}$

$\qquad\qquad\qquad\qquad 2^3 \cdot 2^t = 2^{t+3}$

$\qquad\qquad\qquad\qquad\ 2^{t+3} = 2^{t+3}$

PTS: 2   REF: 011632ai   NAT: A.SSE.B.3   TOP: Modeling Exponential Functions
KEY: AI

57 ANS: 1   PTS: 2   REF: 081618ai   NAT: F.LE.A.3
TOP: Families of Functions

58 ANS: 2   PTS: 2   REF: 081422ai   NAT: F.IF.C.7
TOP: Graphing Piecewise-Defined Functions

59 ANS: 3   PTS: 2   REF: 011513ai   NAT: A.CED.A.1
TOP: Modeling Linear Inequalities

60 ANS:

During 1960-1965 the graph has the steepest slope.

PTS: 2   REF: 011628ai   NAT: F.IF.B.6   TOP: Rate of Change
KEY: AI

61 ANS: 2   PTS: 2   REF: 011709ai   NAT: F.LE.B.5
TOP: Modeling Linear Functions

62 ANS: 2   PTS: 2   REF: 081516ai   NAT: F.IF.C.7
TOP: Graphing Piecewise-Defined Functions   KEY: bimodalgraph

63 ANS:

$1.8 - 0.4y \geq 2.2 - 2y$

$\qquad 1.6y \geq 0.4$

$\qquad\ \ y \geq 0.25$

PTS: 2   REF: 011727ai   NAT: A.REI.B.3   TOP: Solving Linear Inequalities

64 ANS: 1   PTS: 2   REF: 081623ai   NAT: A.APR.B.3
TOP: Zeros of Polynomials   KEY: AI

65 ANS:
Linear, because the function has a constant rate of change.

PTS: 2   REF: 011625ai   NAT: F.LE.A.1   TOP: Families of Functions

66 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

67 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

68 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: Correlation Coefficient and Residuals

69 ANS: 4   PTS: 2   REF: 081604ai   NAT: F.LE.A.2
TOP: Families of Functions

70 ANS: 1   PTS: 2   REF: 011712ai   NAT: F.IF.C.7
TOP: Graphing Absolute Value Functions

71 ANS: 1

$$x^2 - 12x + 7$$

$$x^2 - 12x + 36 - 29$$

$$(x - 6)^2 - 29$$

PTS: 2   REF: 081520ai   NAT: A.SSE.B.3   TOP: Vertex Form of a Quadratic

72 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.SSE.B.3   TOP: Solving Quadratics

73 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

74 ANS: 1

$$C(68) = \frac{5}{9}(68 - 32) = 20$$

PTS: 2   REF: 011710ai   NAT: N.Q.A.1   TOP: Conversions
KEY: formula

75 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

76 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

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

78 ANS: 2

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

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

79 ANS: 3   PTS: 2   REF: 011612ai   NAT: A.SSE.A.2
TOP: Factoring Polynomials   KEY: higher power

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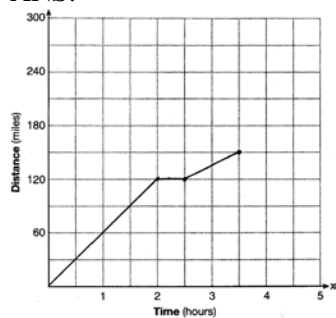
PTS: 2 REF: 081528ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

81 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

82 ANS:
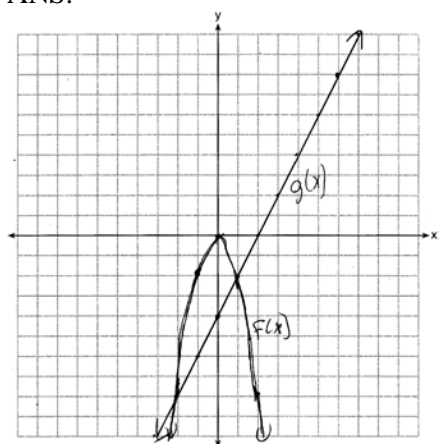
$x = -2, 1$

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

83 ANS: 3 PTS: 2 REF: 081614ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

84 ANS: 1

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

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

85 ANS: 2 PTS: 2 REF: 011605ai NAT: A.REI.D.12
TOP: Graphing Linear Inequalities

86 ANS:

$$B = 3000(1.042)^t$$

PTS: 2   REF: 081426ai   NAT: F.BF.A.1   TOP: Modeling Exponential Functions
KEY: AI

87 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

88 ANS:

$$\frac{m}{351} = \frac{70}{70+35}$$

$$105m = 24570$$

$$m = 234$$

PTS: 2   REF: 011630ai   NAT: S.ID.B.5   TOP: Frequency Tables

89 ANS: 3   PTS: 2   REF: 081412ai   NAT: F.LE.A.1
TOP: Families of Functions

90 ANS: 1   PTS: 2   REF: 081417ai   NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

91 ANS: 2   PTS: 2   REF: 011502ai   NAT: N.Q.A.1
TOP: Conversions   KEY: dimensional analysis

92 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

93 ANS: 3   PTS: 2   REF: 011724ai   NAT: F.LE.B.5
TOP: Modeling Exponential Functions

94 ANS: 1   PTS: 2   REF: 081514ai   NAT: F.LE.A.2
TOP: Sequences

95 ANS: 3   PTS: 2   REF: 011505ai   NAT: F.LE.A.1
TOP: Families of Functions

96 ANS: 2   PTS: 2   REF: 081416ai   NAT: F.LE.A.2
TOP: Sequences

97 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: Identifying Solutions
98 ANS: 2   PTS: 2   REF: 011619ai   NAT: F.IF.A.2
TOP: Domain and Range   KEY: real domain, exponential
99 ANS: 4   PTS: 2   REF: 081421ai   NAT: S.ID.B.6
TOP: Regression   KEY: linear
100 ANS: 1

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

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

PTS: 2   REF: 011617ai   NAT: A.REI.D.11   TOP: Other Systems
KEY: AI
101 ANS: 2   PTS: 2   REF: 011506ai   NAT: F.IF.B.5
TOP: Domain and Range
102 ANS: 4   PTS: 2   REF: 011514ai   NAT: S.ID.A.2
TOP: Central Tendency and Dispersion
103 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.SSE.B.3   TOP: Solving Quadratics
104 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
KEY: AI

105 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
KEY: AI

106 ANS: 2   PTS: 2   REF: 011501ai   NAT: F.LE.B.5
TOP: Modeling Linear Functions

107 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

108 ANS: 2   PTS: 2   REF: 011714ai   NAT: A.SSE.B.3
TOP: Modeling Exponential Functions

109 ANS: 4   PTS: 2   REF: 011621ai   NAT: A.REI.C.5
TOP: Solving Linear Systems

110 ANS:

$$x + y \le 200 \qquad 12x + 8.50(50) \ge 1000$$

$$12x + 8.50y \ge 1000 \qquad 12x + 425 \ge 1000$$

$$12x \ge 575$$

$$x \ge \frac{575}{12}$$

$$48$$

PTS: 4   REF: 081635ai   NAT: A.CED.A.3   TOP: Modeling Systems of Linear Inequalities

111 ANS: 2

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

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

112 ANS: 1   PTS: 2   REF: 081401ai   NAT: N.RN.B.3
TOP: Classifying Numbers

113 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: term

114 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

115 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
KEY: AI

116 ANS: 3
$15 > 5$

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

117 ANS: 4   PTS: 2   REF: 011503ai   NAT: A.SSE.B.3
TOP: Solving Quadratics

118 ANS:
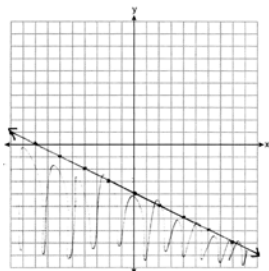
PTS: 4   REF: 081634ai   NAT: A.REI.D.12   TOP: Graphing Linear Inequalities

119 ANS: 2   PTS: 2   REF: 011611ai   NAT: A.CED.A.1
TOP: Geometric Applications of Quadratics

120 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

121 ANS: 3   PTS: 2   REF: 081403ai   NAT: A.REI.B.4
TOP: Solving Quadratics   KEY: taking square roots

122 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

123 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

124 ANS: 3   PTS: 2   REF: 081410ai   NAT: F.LE.A.1
TOP: Families of Functions   KEY: bimodalgraph

125 ANS: 3   PTS: 2   REF: 081523ai   NAT: A.REI.B.4
TOP: Solving Quadratics   KEY: taking square roots

126 ANS: 1

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

PTS: 2   REF: 081504ai   NAT: A.APR.B.3   TOP: Zeros of Polynomials
KEY: AI

127 ANS: 1   PTS: 2   REF: 081610ai   NAT: F.LE.A.2
TOP: Sequences

128 ANS:

$2p + 3d = 18.25$ $4p + 6d = 36.50$ $4p + 2(2.25) = 27.50$

$4p + 2d = 27.50$ $4p + 2d = 27.50$ $4p = 23$

$4d = 9$ $p = 5.75$

$d = 2.25$

PTS: 2   REF: 011533ai   NAT: A.CED.A.3   TOP: Modeling Linear Systems

129 ANS: 1   PTS: 2   REF: 081415ai   NAT: A.SSE.A.2
TOP: Factoring Polynomials   KEY: higher power

130 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

131 ANS:

$1 - 0.95 = 0.05 = 5\%$ To find the rate of change 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

132 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

133 ANS: 3   PTS: 2   REF: 081506ai   NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities   KEY: bimodalgraph | graph

134 ANS:
Correct. The sum of a rational and irrational is irrational.

PTS: 2   REF: 011525ai   NAT: N.RN.B.3   TOP: Classifying Numbers

135 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

136 ANS:
$I = 1000 - 60x$. $x = 10$. $1000 - 60(10) = 400$. Ian is incorrect because $I = 1000 - 6(16) = 40 \neq 0$

$$K = 600 - 20x$$

$$1000 - 60x = 600 - 20x$$

PTS: 6   REF: 011737ai   NAT: A.CED.A.3   TOP: Modeling Linear Systems

137 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
KEY: AI

138 ANS: 4   PTS: 2   REF: 011719ai   NAT: F.IF.B.5
TOP: Domain and Range

139 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.LE.A.1   TOP: Families of Functions

140 ANS: 3   PTS: 2   REF: 011518ai   NAT: A.REI.D.11
TOP: Other Systems   KEY: AI

141 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

142 ANS: 3   PTS: 2   REF: 011704ai   NAT: A.CED.A.4
TOP: Transforming Formulas

143 ANS:
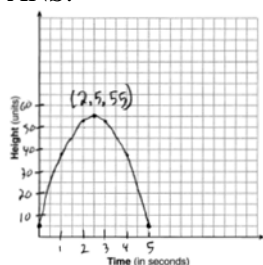
The ball reaches a maximum height of 55 units at 2.5 seconds.

PTS: 4   REF: 011736ai   NAT: F.IF.B.4   TOP: Graphing Quadratic Functions

144 ANS: 2
$r = 0.92$

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

145 ANS: 1   PTS: 2   REF: 081617ai   NAT: F.LE.A.2
TOP: Modeling Exponential Functions   KEY: AI

146 ANS: 2   PTS: 2   REF: 081620ai   NAT: F.IF.B.5
TOP: Domain and Range

147 ANS: 1   PTS: 2   REF: 011721ai   NAT: F.IF.B.6
TOP: Rate of Change

148 ANS: 1
$f(2) = 0$

$f(6) = 8$

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

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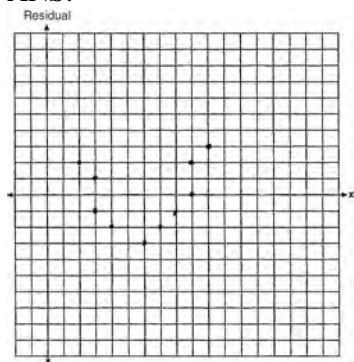
The line is a poor fit because the residuals form a pattern.

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

150 ANS:
No, −2 is the coefficient of the term with the highest power.

PTS: 2   REF: 081628ai   NAT: A.SSE.A.1   TOP: Families of Functions

151 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

152 ANS: 4   PTS: 2   REF: 081419ai   NAT: A.CED.A.3
TOP: Modeling Linear Systems

153 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

154 ANS: 3   PTS: 2   REF: 081509ai   NAT: A.SSE.A.2
TOP: Factoring Polynomials   KEY: quadratic

155 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

156   ANS: 3

		Company 1	Company 2
1	median salary	33,500	36,250
2	mean salary	33,750	44,125
3	salary range	8,000	36,000
4	mean age	28.25	28.25

   PTS: 2   REF: 081404ai   NAT: S.ID.A.2   TOP: Central Tendency and Dispersion
157   ANS:
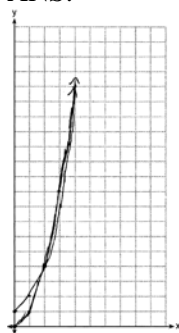
$g(x)$ has a greater value: $2^{20} > 20^2$

   PTS: 4   REF: 081533ai   NAT: F.LE.A.3   TOP: Families of Functions
158   ANS: 4   PTS: 2   REF: 011523ai   NAT: F.BF.A.1
   TOP: Modeling Linear Functions
159   ANS: 4

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

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

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

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

   PTS: 2   REF: 081521ai   NAT: F.IF.C.9   TOP: Comparing Functions
   KEY: AI
160   ANS: 1   PTS: 2   REF: 011604ai   NAT: N.RN.B.3
   TOP: Classifying Numbers
161   ANS: 1
   $2h + 8 > 3h - 6$

      $14 > h$

       $h < 14$

   PTS: 2   REF: 081607ai   NAT: A.REI.B.3   TOP: Solving Linear Inequalities
162   ANS: 4   PTS: 2   REF: 011703ai   NAT: S.ID.C.8
   TOP: Correlation Coefficient

163 ANS: 4 PTS: 2 REF: 011616ai NAT: F.LE.A.2
TOP: Families of Functions

164 ANS:

Since $(x + p)^2 = x^2 + 2px + p^2$, p is half the coefficient of x, and the constant term is equal to p^2. $\left(\dfrac{6}{2}\right)^2 = 9$

PTS: 2 REF: 081432ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

165 ANS: 1 PTS: 2 REF: 011620ai NAT: F.BF.B.3
TOP: Transformations with Functions KEY: bimodalgraph

166 ANS: 3 PTS: 2 REF: 011702ai NAT: A.SSE.B.3
TOP: Solving Quadratics

167 ANS:

The vertex represents a maximum since $a < 0$. $\quad f(x) = -x^2 + 8x + 9$

$$= -(x^2 - 8x - 9)$$
$$= -(x^2 - 8x + 16) + 9 + 16$$
$$= -(x - 4)^2 + 25$$

PTS: 4 REF: 011536ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

168 ANS:
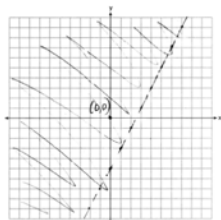
PTS: 2 REF: 011729ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

169 ANS:

$(x - 3)^2 - 49 = 0$

$\quad (x - 3)^2 = 49$

$\qquad x - 3 = \pm 7$

$\qquad\quad x - -4, 10$

PTS: 2 REF: 081631ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

170 ANS:
$-3, 1$

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

21

171 ANS:
$C = 1.29 + .99(s - 1)$ No, because $C = 1.29 + .99(52 - 1) = 51.78$

PTS: 2   REF: 011730ai   NAT: A.CED.A.2   TOP: Modeling Linear Equations

172 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.SSE.B.3   TOP: Solving Quadratics

173 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: Classifying Numbers

174 ANS: 3   PTS: 2   REF: 081507ai   NAT: F.LE.A.2
TOP: Modeling Exponential Functions   KEY: AI

175 ANS: 2   PTS: 2   REF: 081402ai   NAT: F.LE.B.5
TOP: Modeling Linear Functions

176 ANS:
$h(n) = 1.5(n - 1) + 3$

PTS: 2   REF: 081525ai   NAT: F.BF.A.1   TOP: Modeling Linear Functions

177 ANS:
$12 \text{ km}\left(\frac{0.62 \text{ m}}{1 \text{ km}}\right) = 7.44 \text{ m}$ $\frac{26.2 \text{ m}}{7.44 \text{ mph}} \approx 3.5 \text{ hours}$

PTS: 2   REF: 011726ai   NAT: N.Q.A.1   TOP: Conversions
KEY: dimensional analysis

178 ANS: 3   PTS: 2   REF: 011622ai   NAT: F.IF.C.9
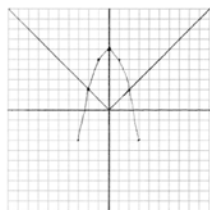TOP: Comparing Functions   KEY: AI

179 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
KEY: AI

180 ANS: 4   PTS: 2   REF: 011718ai   NAT: A.SSE.A.1
TOP: Modeling Expressions

181 ANS: 3   PTS: 2   REF: 011711ai   NAT: F.LE.A.1
    TOP: Families of Functions
182 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
183 ANS:
    $185 + 0.03x = 275 + 0.025x$

    $\quad 0.005x = 90$

    $\qquad x = 18000$

    PTS: 2   REF: 081427ai   NAT: A.REI.C.6   TOP: Solving Linear Systems
    KEY: substitution
184 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
185 ANS: 3   PTS: 2   REF: 081616ai   NAT: A.CED.A.1
    TOP: Modeling Linear Equations
186 ANS: 2   PTS: 2   REF: 081624ai   NAT: F.LE.B.5
    TOP: Modeling Exponential Functions
187 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
    KEY: AI
188 ANS:
    $\dfrac{V}{\pi h} = \dfrac{\pi r^2 h}{\pi h}$ $d = 2\sqrt{\dfrac{66}{3.3\pi}} \approx 5$

    $\dfrac{V}{\pi h} = r^2$

    $\sqrt{\dfrac{V}{\pi h}} = r$

    PTS: 4   REF: 081535ai   NAT: A.CED.A.4   TOP: Transforming Formulas

23

189 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

190 ANS: 1   PTS: 2   REF: 011524ai   NAT: A.APR.B.3
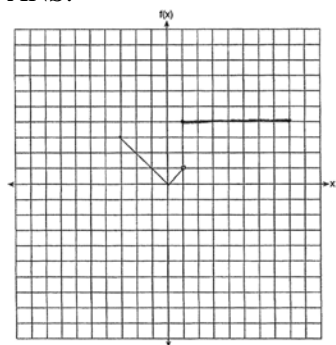TOP: Zeros of Polynomials   KEY: AI

191 ANS: 2   PTS: 2   REF: 011512ai   NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

192 ANS:

PTS: 2   REF: 011530ai   NAT: F.IF.C.7   TOP: Graphing Piecewise-Defined Functions

193 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

194 ANS: 2   PTS: 2   REF: 011713ai   NAT: S.ID.C.9
TOP: Analysis of Data

195 ANS: 4

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

$4 < 40 \qquad\qquad 4 < 22$

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

196 ANS: 3   PTS: 2   REF: 011515ai   NAT: F.LE.B.5
TOP: Modeling Exponential Functions

197 ANS: 2   PTS: 2   REF: 011601ai   NAT: A.SSE.B.3
TOP: Vertex Form of a Quadratic

198 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

199 ANS:

$x^2 + 10x + 24 = (x + 4)(x + 6) = (x + 6)(x + 4)$. 6 and 4

PTS: 2   REF: 081425ai   NAT: A.SSE.B.3   TOP: Solving Quadratics

200 ANS:

$f(x) = 0.75x + 4.50$. Each card costs 75¢ and start-up costs were $4.50.

PTS: 4   REF: 011735ai   NAT: F.BF.A.1   TOP: Modeling Linear Functions

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

TOP: Graphing Systems of Linear Inequalities   KEY: solution set

202 ANS:

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

$$5x = 12$$

$$x = 2.4$$

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

203 ANS:

$$\frac{33 + 12}{180} = 25\%$$

PTS: 2   REF: 011526ai   NAT: S.ID.B.5   TOP: Frequency Tables

204 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

205 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: A.REI.B.4   TOP: Solving Quadratics
KEY: completing the square

206 ANS: 4   PTS: 2   REF: 081405ai   NAT: A.REI.D.10
TOP: Identifying Solutions

207 ANS: 4   PTS: 2   REF: 081508ai   NAT: A.CED.A.3
TOP: Modeling Linear Equations

208 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

209 ANS: 2   PTS: 2   REF: 011723ai   NAT: F.IF.C.9
TOP: Comparing Functions

210 ANS: 3   PTS: 2   REF: 011606ai   NAT: A.CED.A.4
TOP: Transforming Formulas

211 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

212 ANS: 4

$$y + 3 = 6(0)$$

$$y = -3$$

PTS: 2   REF: 011509ai   NAT: F.IF.B.4   TOP: Graphing Linear Functions

213 ANS:
The slope represents the amount paid each month and the *y*-intercept represents the initial cost of membership.
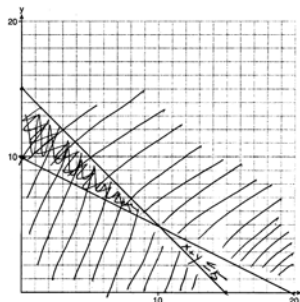
PTS: 2   REF: 011629ai   NAT: F.LE.B.5   TOP: Modeling Linear Functions

214 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: Classifying Numbers

215 ANS:

$x + y \le 15$ One hour at school and eleven hours at the library.

$4x + 8y \ge 80$

PTS: 6   REF: 081437ai   NAT: A.CED.A.3   TOP: Modeling Systems of Linear Inequalities

216 ANS:

g. The maximum of f is 6. For g, the maximum is 11. $x = \dfrac{-b}{2a} = \dfrac{-4}{2\left(-\dfrac{1}{2}\right)} = \dfrac{-4}{-1} = 4$

$$y = -\frac{1}{2}(4)^2 + 4(4) + 3 = -8 + 16 + 3 = 11$$

PTS: 2   REF: 081429ai   NAT: F.IF.C.9   TOP: Comparing Functions
KEY: AI

217 ANS: 4   PTS: 2   REF: 081622ai   NAT: A.REI.C.5
TOP: Solving Linear Systems

218 ANS: 1   PTS: 2   REF: 081515ai   NAT: F.IF.B.6
TOP: Rate of Change   KEY: AI

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

220 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

221 ANS: 2   PTS: 2   REF: 011717ai   NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

222 ANS:
$\dfrac{480 - 140}{7 - 2} = 68\,\text{mph}$
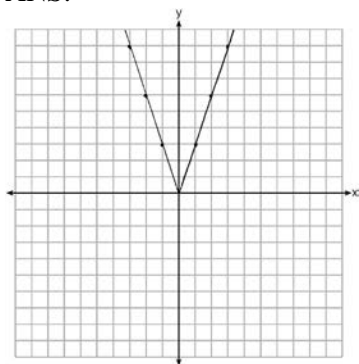
PTS: 2   REF: 011731ai   NAT: F.IF.B.6   TOP: Rate of Change

223 ANS:

2 down. 4 right.

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

Algebra I Common Core State Standards Regents at Random
Answer Section

224 ANS: 4 PTS: 2 REF: 061502ai NAT: F.IF.B.4
TOP: Relating Graphs to Events

225 ANS:
Yes, because every element of the domain is assigned one unique element in the range.
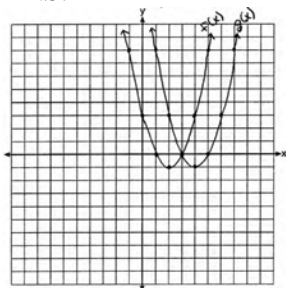
PTS: 2 REF: 061430ai NAT: F.IF.A.1 TOP: Defining Functions
KEY: ordered pairs

226 ANS: 3 PTS: 2 REF: 061504ai NAT: F.IF.A.1
TOP: Defining Functions KEY: ordered pairs

227 ANS: 2 PTS: 2 REF: 061416ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

228 ANS: 2 PTS: 2 REF: 061404ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph

229 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

230 ANS:
$2(-1) + a(-1) - 7 > -12$ $a = 2$

$$-a - 9 > -12$$
$$-a > -3$$
$$a < 3$$

PTS: 2 REF: 061427ai NAT: A.REI.B.3 TOP: Interpreting Solutions

231 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

232 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

233 ANS:
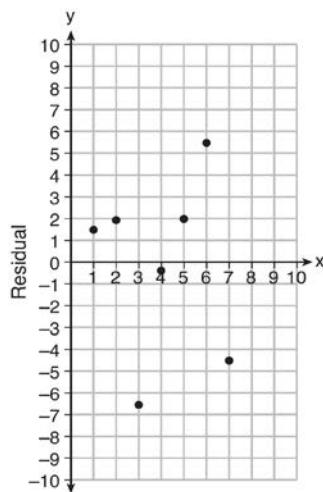$-3x + 7 - 5x < 15$ 0 is the smallest integer.

$$-8x < 8$$

$$x > -1$$

PTS: 2   REF: 061530ai   NAT: A.REI.B.3   TOP: Interpreting Solutions

234 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: Correlation Coefficient and Residuals

235 ANS: 3   PTS: 2   REF: 061412ai   NAT: A.SSE.B.3
TOP: Solving Quadratics

236 ANS: 1   PTS: 2   REF: 061401ai   NAT: A.REI.A.1
     TOP: Identifying Properties
237 ANS: 1   PTS: 2   REF: 061505ai   NAT: A.REI.D.12
     TOP: Graphing Linear Inequalities
238 ANS: 4

$x^2 - 13x - 30 = 0$

$(x - 15)(x + 2) = 0$

$x = 15, -2$

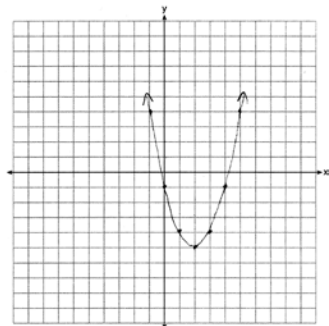   PTS: 2   REF: 061510ai   NAT: A.APR.B.3   TOP: Zeros of Polynomials
     KEY: AI
239 ANS: 2   PTS: 2   REF: 061403ai   NAT: A.APR.A.1
     TOP: Operations with Polynomials   KEY: subtraction
240 ANS: 4   PTS: 2   REF: 061509ai   NAT: F.IF.A.2
     TOP: Domain and Range   KEY: graph
241 ANS:

$x = \dfrac{-b}{2a} = \dfrac{-(-4)}{2(1)} = \dfrac{4}{2} = 2 \quad y = (2)^2 - 4(2) - 1 = 4 - 8 - 1 = -5$
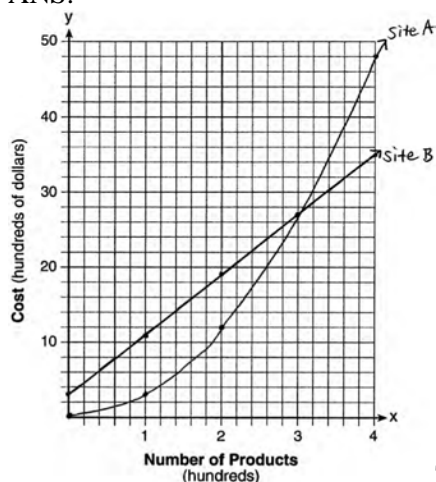
     PTS: 2   REF: 061627ai   NAT: F.IF.B.4   TOP: Graphing Quadratic Functions
242 ANS:

$g(x) = 2(2x + 1)^2 - 1 = 2(4x^2 + 4x + 1) - 1 = 8x^2 + 8x + 2 - 1 = 8x^2 + 8x + 1$

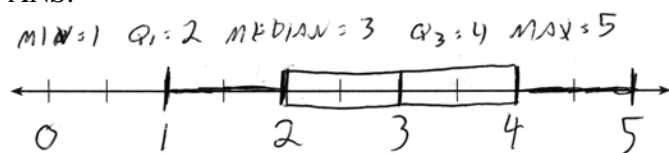   PTS: 2   REF: 061625ai   NAT: F.IF.A.2   TOP: Functional Notation

243 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
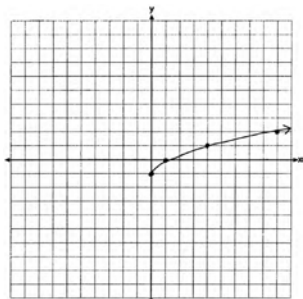KEY: AI

244 ANS:

MIN=1 Q₁=2 MEDIAN=3 Q₃=4 MAX=5

PTS: 2   REF: 061432ai   NAT: S.ID.A.1   TOP: Box Plots
KEY: represent

245 ANS:

PTS: 2   REF: 061425ai   NAT: F.IF.C.7   TOP: Graphing Root Functions

246 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

247 ANS: 3   PTS: 2   REF: 061409ai   NAT: F.IF.B.4
TOP: Graphing Quadratic Functions

248 ANS: 4   PTS: 2   REF: 061406ai   NAT: F.LE.A.1
TOP: Families of Functions

249 ANS:

$$m = \frac{4-1}{-3-6} = \frac{3}{-9} = -\frac{1}{3} \quad y - y_1 = m(x - x_1)$$

$$4 = -\frac{1}{3}(-3) + b \qquad y - 4 = -\frac{1}{3}(x + 3)$$

$$4 = 1 + b$$

$$3 = b$$

$$y = -\frac{1}{3}x + 3$$

PTS: 2　　　REF: 061629ai　　NAT: A.REI.D.10　TOP: Writing Linear Equations
KEY: other forms

250 ANS: 2　　　PTS: 2　　　REF: 061503ai　　NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares　　　KEY: higher power

251 ANS: 4　　　PTS: 2　　　REF: 061623ai　　NAT: F.IF.B.5
TOP: Domain and Range

252 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

253 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 Polynomials
KEY: higher power

254 ANS:

$y = 80(1.5)^x \quad 80(1.5)^{26} \approx 3{,}030{,}140.$ No, because the prediction at $x = 52$ is already too large.

PTS: 4　　　REF: 061536ai　　NAT: S.ID.B.6　　TOP: Regression
KEY: exponential

255 ANS: 3

median = 3, IQR = 4 − 2 = 2, $\bar{x}$ = 2.75. An outlier is outside the interval $[Q_1 - 1.5(\text{IQR}), Q_3 + 1.5(\text{IQR})]$.

$[2 - 1.5(2), 4 + 1.5(2)]$

$[-1, 7]$

PTS: 2   REF: 061620ai   NAT: S.ID.A.1   TOP: Dot Plots

256 ANS: 1

$x^2 - 8x + 16 = 24 + 16$

$(x - 4)^2 = 40$

$x - 4 = \pm\sqrt{40}$

$x = 4 \pm 2\sqrt{10}$

PTS: 2   REF: 061523ai   NAT: A.REI.B.4   TOP: Solving Quadratics
KEY: completing the square

257 ANS:

a) $p + d \le 800$ b) $6(440) + 9d \ge 5000$ Since $440 + 263 \le 800$, it is possible.

$6p + 9d \ge 5000$ $2640 + 9d \ge 5000$

$9d \ge 2360$

$d \ge 262.\bar{2}$

PTS: 2   REF: spr1306ai   NAT: A.CED.A.3   TOP: Modeling Systems of Linear Inequalities

258 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

259 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

260 ANS: 4   PTS: 2   REF: 061422ai   NAT: A.CED.A.3
TOP: Modeling Linear Equations

261 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

262 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
KEY: AI

263 ANS: 4   PTS: 2   REF: 061417ai   NAT: F.IF.A.2
TOP: Domain and Range   KEY: real domain, linear

264 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
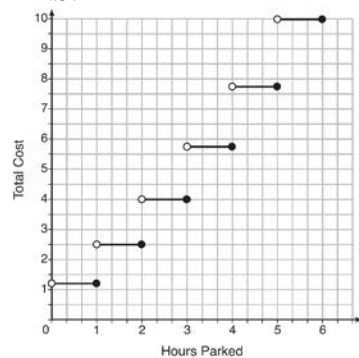KEY: quadratic formula

265 ANS: 2   PTS: 2   REF: 061516ai   NAT: S.ID.C.9
TOP: Analysis of Data

266 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

267 ANS:

$$\frac{S}{180} = n - 2$$

$$\frac{S}{180} + 2 = n$$

PTS: 2   REF: 061631ai   NAT: A.CED.A.4   TOP: Transforming Formulas

268 ANS:

$f(x) = 6.50x + 4(12)$

PTS: 2   REF: 061526ai   NAT: F.BF.A.1   TOP: Modeling Linear Functions

269 ANS:

$2.35c + 5.50d = 89.50$ Pat's numbers are not possible: $2.35(8) + 5.50(14) \neq 89.50$ $c + d = 22$

$18.80 + 77.00 \neq 89.50$ $2.35c + 5.50(22 - c) = 89.50$

$95.80 \neq 89.50$ $2.35c + 121 - 5.50c = 89.50$

$-3.15c = -31.50$

$c = 10$

PTS: 4   REF: 061436ai   NAT: A.CED.A.3   TOP: Modeling Linear Systems

270 ANS: 3   PTS: 2   REF: 061501ai   NAT: F.LE.B.5

TOP: Modeling Linear Functions

271 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

272 ANS: 2   PTS: 2   REF: 061517ai   NAT: F.LE.B.5

TOP: Modeling Exponential Functions

273 ANS:

$A = 600(1.016)^2 \approx 619.35$
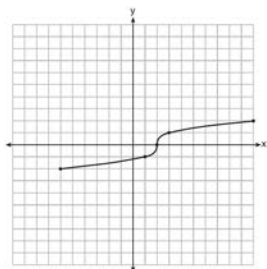
PTS: 2   REF: 061529ai   NAT: A.CED.A.1   TOP: Modeling Exponential Functions

274 ANS: 4

$$\frac{30}{30 + 12 + 8} = 0.6$$

PTS: 2   REF: 061615ai   NAT: S.ID.B.5   TOP: Frequency Tables

275 ANS:

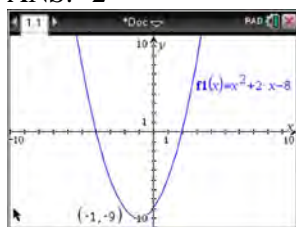PTS: 2 REF: fall1304ai NAT: F.IF.C.7 TOP: Graphing Root Functions

276 ANS: 2
$y = (x - 3)(x + 2)(x - 1)$

PTS: 2 REF: 061512ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

277 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
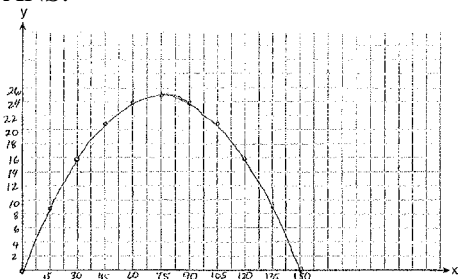KEY: real domain, quadratic

278 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
KEY: AI

279 ANS:

$$x = \dfrac{-\dfrac{2}{3}}{2\left(-\dfrac{1}{225}\right)} = -\dfrac{2}{3} \cdot -\dfrac{225}{2} = 75 \quad y = -\dfrac{1}{225}(75)^2 + \dfrac{2}{3}(75) = -25 + 50 = 25$$

(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 $y = -\dfrac{1}{225}(135)^2 + \dfrac{2}{3}(135) = -81 + 90 = 9$

PTS: 6   REF: 061537ai   NAT: F.IF.B.4   TOP: Graphing Quadratic Functions

280 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

281 ANS: 2

$$x^2 - 6x = 12$$
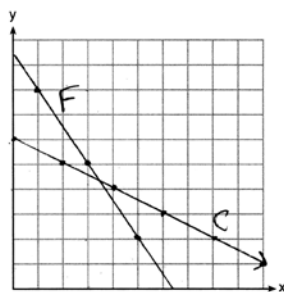$$x^2 - 6x + 9 = 12 + 9$$
$$(x - 3)^2 = 21$$

PTS: 2   REF: 061408ai   NAT: A.REI.B.4   TOP: Solving Quadratics
KEY: completing the square

282 ANS:

$3x + 2y = 19$ $6x + 4y = 38$ $2(3.50) + 4y = 24$

$2x + 4y = 24$ $2x + 4y = 24$ $7 + 4y = 24$

                  $4x = 14$ $4y = 17$

                  $x = 3.50$ $y = 4.25$

PTS: 6   REF: 061637ai   NAT: A.REI.C.6   TOP: Graphing Linear Systems

283 ANS: 2   PTS: 2   REF: 061604ai   NAT: S.ID.C.8
TOP: Correlation Coefficient

284 ANS: 2   PTS: 2   REF: 061617ai   NAT: F.BF.A.1
TOP: Modeling Exponential Functions

285 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

286 ANS:
$8x + 11y \geq 200$ $8x + 11(15) \geq 200$

$8x + 165 \geq 200$

$8x \geq 35$

$x \geq 4.375$

5 hours

PTS: 4   REF: fall1309ai   NAT: A.CED.A.3   TOP: Modeling Linear Inequalities

287 ANS: 4

Over the interval $0 \leq x \leq 3$, the average rate of change for $h(x) = \frac{9-2}{3-0} = \frac{7}{3}$, $f(x) = \frac{7-1}{3-0} = \frac{6}{3} = 2$, and

$g(x) = \frac{3-0}{3-0} = \frac{3}{3} = 1$.

PTS: 2   REF: spr1301ai   NAT: F.IF.B.6   TOP: Rate of Change
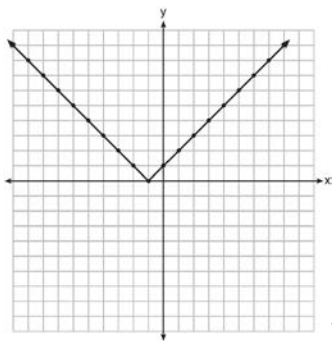KEY: AI

288 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

11

289 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

290 ANS: 2

$$7 < \frac{7.2 + 7.6 + p_L}{3} \quad \text{and} \quad \frac{7.2 + 7.6 + p_H}{3} < 7.8$$

$$6.2 < p_L \qquad\qquad p_H < 8.6$$

PTS: 2 REF: 061607ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

291 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
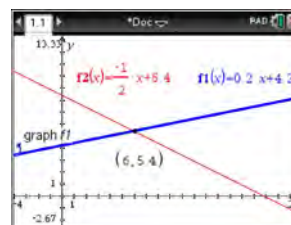
292 ANS: 3 PTS: 2 REF: 061522ai NAT: F.LE.A.2

TOP: Sequences

293 ANS: 4

$$m = \frac{5 - 4.6}{4 - 2} = \frac{.4}{2} = 0.2 \quad 4(0.2x + 4.2) + 2x = 33.6 \quad y = 0.2(6) + 4.2 = 5.4$$

$$5 = .2(4) + b \qquad\qquad 0.8x + 16.8 + 2x = 33.6$$

$$4.2 = b \qquad\qquad\qquad 2.8x = 16.8$$

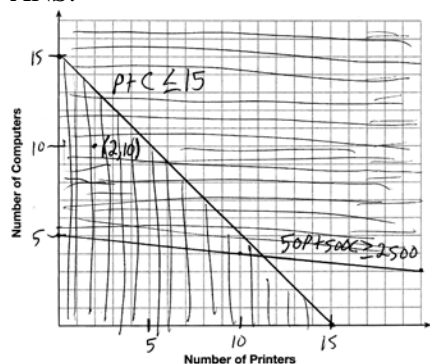$$y = 0.2x + 4.2 \qquad\qquad\qquad x = 6$$

PTS: 2 REF: 061618ai NAT: A.REI.C.6 TOP: Solving Linear Systems
KEY: substitution

294 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

295 ANS: 4   PTS: 2   REF: spr1304ai   NAT: A.CED.A.1
TOP: Geometric Applications of Quadratics

296 ANS: 3

$h(x) = -x^2 + x + 6$ Maximum of $f(x) = 9$ $k(x) = -5x^2 - 12x + 4$ Maximum of $g(x) < 5$

$$x = \frac{-1}{2(-1)} = \frac{1}{2}$$

$$x = \frac{12}{2(-5)} = -\frac{6}{5}$$

$$y = -\left(\frac{1}{2}\right)^2 + \frac{1}{2} + 6$$

$$y = -5\left(-\frac{6}{5}\right)^2 - 12\left(-\frac{6}{5}\right) + 4$$

$$= -\frac{1}{4} + \frac{2}{4} + 6$$

$$= -\frac{36}{5} + \frac{72}{5} + \frac{20}{5}$$

$$= 6\frac{1}{4}$$

$$= \frac{56}{5}$$

$$= 11\frac{1}{5}$$

PTS: 2   REF: 061514ai   NAT: F.IF.C.9   TOP: Comparing Functions
KEY: AI

297 ANS: 4   PTS: 2   REF: 061602ia   NAT: A.SSE.A.1
TOP: Modeling Expressions

298 ANS:

$m(x) = (3x - 1)(3 - x) + 4x^2 + 19$ $x^2 + 10x + 16 = 0$

$m(x) = 9x - 3x^2 - 3 + x + 4x^2 + 19$ $(x + 8)(x + 2) = 0$

$m(x) = x^2 + 10x + 16$ $x = -8, -2$

PTS: 4   REF: 061433ai   NAT: A.REI.B.4   TOP: Solving Quadratics
KEY: factoring

299 ANS: 3   PTS: 2   REF: 061411ai   NAT: S.ID.C.8
TOP: Correlation Coefficient

300 ANS: 2   PTS: 2   REF: 061424ai   NAT: F.LE.A.2
      TOP: Sequences
301 ANS:

$y = 836.47(2.05)^x$ 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
302 ANS: 2   PTS: 2   REF: 061508ai   NAT: N.RN.B.3
      TOP: Classifying Numbers
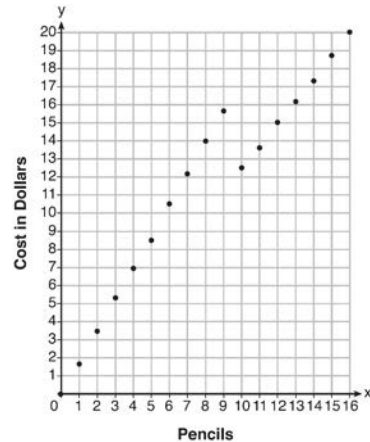303 ANS:

$34 = l\left(\dfrac{1}{2}l\right)$

$68 = l^2$

$8.2 \approx l$

$4.1 \approx w$

      PTS: 2   REF: 061532ai   NAT: A.CED.A.1   TOP: Geometric Applications of Quadratics
304 ANS:

Since according to the graph, 8 pencils cost $14 and 10 pencils cost $12.50, the cashier is correct.

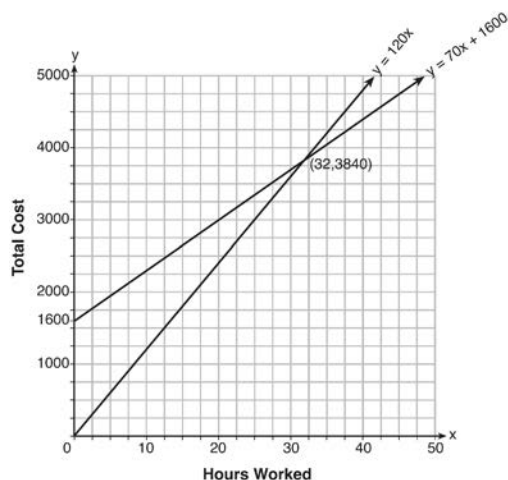   PTS: 4   REF: fall1312ai   NAT: F.IF.C.7   TOP: Graphing Piecewise-Defined Functions
305 ANS:

$2x^2 + 5x - 42 = 0$ Agree, as shown by solving the equation by factoring.

$(x + 6)(2x - 7) = 0$

$x = -6, \dfrac{7}{2}$

      PTS: 2   REF: 061628ai   NAT: A.REI.B.4   TOP: Solving Quadratics
      KEY: factoring

306 ANS:

$y = 120x$ and $y = 70x + 1600$

$$120x = 70x + 1600$$
$$50x = 1600$$
$$x = 32$$

$y = 120(35) = 4200$ Green Thumb is less expensive.

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

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

307 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: Correlation Coefficient and Residuals

308 ANS:

$24x + 27y = 144$ $-8.5y = -51$ Agree, as both systems have the same solution.

$24x + 10y = 42$ $y = 6$

$17y = 102$ $8x + 9(6) = 48$

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

$8x + 9(6) = 48$ $x = -\dfrac{3}{4}$

$8x = -6$

$x = -\dfrac{3}{4}$

PTS: 4   REF: 061533ai   NAT: A.REI.C.5   TOP: Solving Linear Systems

309 ANS: 1   PTS: 2   REF: 061603ai   NAT: F.IF.B.6
TOP: Rate of Change   KEY: AI

310 ANS: 2   PTS: 2   REF: 061624ai   NAT: F.LE.A.1
TOP: Families of Functions

311 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
KEY: AI

312 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: Correlation Coefficient and Residuals

313 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

314 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
KEY: AI

315 ANS: 3
$\sqrt{16} + \sqrt{9} = \frac{7}{1}$ may be expressed as the ratio of two integers.

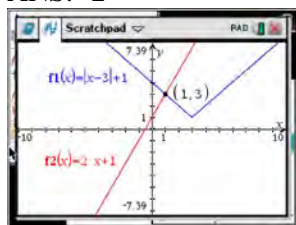PTS: 2 REF: 061413ai NAT: N.RN.B.3 TOP: Classifying Numbers

316 ANS:
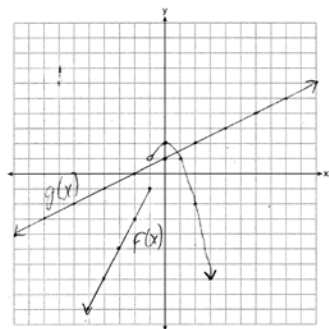
1, because the graphs only intersect once.

PTS: 4 REF: 061636ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

317 ANS: 2

$$|x-3|+1=2x+1 \quad x-3=2x \qquad x-3=-2x$$
$$|x-3|=2x \qquad -3=x \qquad 3x=3$$
$$\text{extraneous} \qquad x=1$$

PTS: 2   REF: 061622ai   NAT: A.REI.D.11   TOP: Other Systems
KEY: AI

318 ANS: 3
Median remains at 1.4.

PTS: 2   REF: 061520ai   NAT: S.ID.A.3   TOP: Central Tendency and Dispersion
KEY: outliers

319 ANS: 3   PTS: 2   REF: 061415ai   NAT: F.LE.A.2
TOP: Families of Functions

320 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
KEY: AI

321 ANS: 4
$3x+2\le 5x-20$

$22\le 2x$

$11\le x$

PTS: 2   REF: 061609ai   NAT: A.REI.B.3   TOP: Solving Linear Inequalities

322 ANS: 3   PTS: 2   REF: 061601ai   NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares   KEY: higher power

17

323 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

324 ANS: 1

$$12.5 \sec \times \frac{1 \min}{60 \sec} = 0.208\overline{3} \min$$
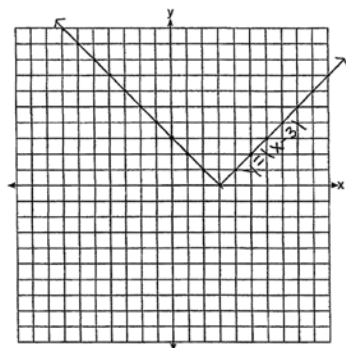
PTS: 2 REF: 061608ai NAT: N.Q.A.1 TOP: Conversions
KEY: dimensional analysis

325 ANS:
There is 2 inches of snow every 4 hours.

PTS: 2 REF: 061630ai NAT: S.ID.C.7 TOP: Modeling Linear Functions

326 ANS:

The graph has shifted three units to the right.

PTS: 2 REF: 061525ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

327 ANS: 3
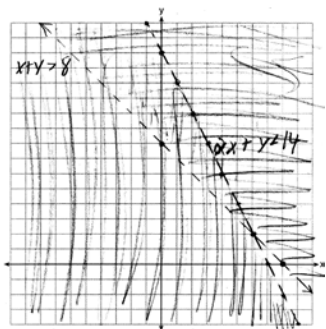
$$a_n = 3n + 1$$

$$a_5 = 3(5) + 1 = 16$$

PTS: 2 REF: 061613ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

328 ANS: 3 PTS: 2 REF: 061407ai NAT: F.LE.B.5
TOP: Modeling Linear Functions

329 ANS:

 (6,2) is not a solution as its falls on the edge of each inequality.
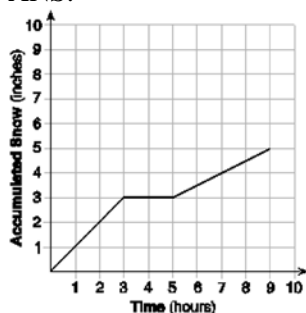
PTS: 4 REF: 061634ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

330 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

331 ANS: 4
There are no negative or fractional cars.

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

332 ANS: 4

$$\frac{750 + 2.25p}{p} > 2.75 \qquad \frac{750 + 2.25p}{p} < 3.25$$

$$750 + 2.25p > 2.75p \qquad 750 + 2.25p < 3.25p$$

$$750 > .50p \qquad\qquad 750 < p$$

$$1500 > p$$

PTS: 2 REF: 061524ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities
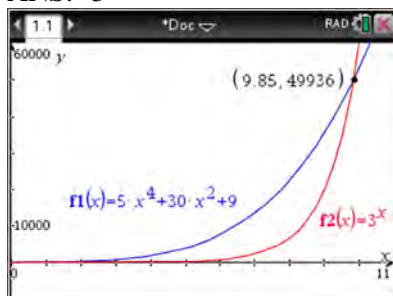
333 ANS: 1 PTS: 2 REF: 061507ai NAT: F.IF.C.7
TOP: Graphing Step Functions KEY: bimodalgraph

334 ANS: 3

PTS: 2   REF: 061621ai   NAT: F.LE.A.3   TOP: Families of Functions

335 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
KEY: AI

336 ANS: 1   PTS: 2   REF: 061420ai   NAT: F.IF.A.2
TOP: Functional Notation

337 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

338 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

339 ANS:
$$y = 0.05x - 0.92$$

PTS: 2   REF: fall1307ai   NAT: S.ID.B.6   TOP: Regression
KEY: linear

340 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

341 ANS: 1   PTS: 2   REF: 061521ai   NAT: A.REI.B.4
     TOP: Solving Quadratics   KEY: taking square roots

342 ANS: 4   PTS: 2   REF: 061421ai   NAT: F.LE.A.2
     TOP: Sequences

343 ANS: 2

$2(3x - y = 4)$

$6x - 2y = 8$

     PTS: 2   REF: 061414ai   NAT: A.REI.C.5   TOP: Solving Linear Systems

344 ANS: 1   PTS: 2   REF: 061605ai   NAT: A.CED.A.3
     TOP: Modeling Linear Systems

345 ANS:

$3\sqrt{2} \cdot 8\sqrt{18} = 24\sqrt{36} = 144$, which can be written as the ratio of two integers.

     PTS: 2   REF: 061626ai   NAT: N.RN.B.3   TOP: Classifying Numbers

346 ANS: 3   PTS: 2   REF: spr1302ai   NAT: A.APR.B.3
     TOP: Zeros of Polynomials   KEY: AI

347 ANS: 2   PTS: 2   REF: 061513ai   NAT: F.LE.A.2
     TOP: Families of Functions

348 ANS: 1
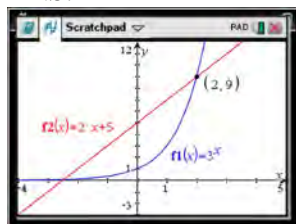
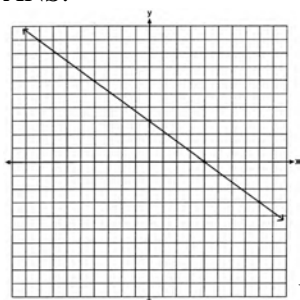

$f(-1) < g(-1)$

$3^{-1} < 2(-1) + 5$

$\dfrac{1}{3} < 3$

     PTS: 2   REF: 061515ai   NAT: F.LE.A.3   TOP: Families of Functions

349 ANS:

$w(52) - w(38)$ $15(x - 40) + 400 = 445$ Since $w(x) > 400$, $x > 40$. I substituted 445 for $w(x)$ and solved

$15(52 - 40) + 400 - 10(38)$ $15(x - 40) = 45$

$180 + 400 - 380$ $x - 40 = 3$

200 $x = 43$

for x.

     PTS: 4   REF: 061534ai   NAT: F.IF.A.2   TOP: Functional Notation

350 ANS: 1   PTS: 2   REF: 061606ai   NAT: F.LE.A.1
     TOP: Families of Functions

351 ANS:

 No, because $(3,2)$ is not on the graph.

PTS: 2 REF: 061429ai NAT: A.REI.D.10 TOP: Identifying Solutions

352 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

353 ANS: 3

$a + p = 165$ $1.75(165 - p) + 2.5p = 337.5$

$1.75a + 2.5p = 337.5$ $288.75 - 1.75p + 2.5p = 337.5$

$$0.75p = 48.75$$
$$p = 65$$

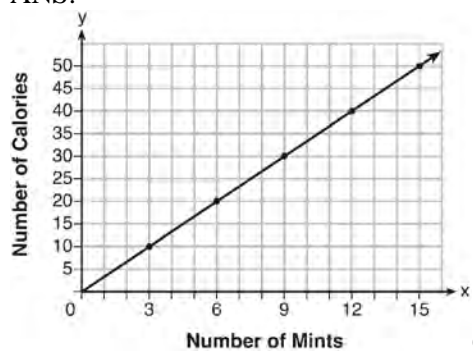PTS: 2 REF: 061506ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

354 ANS:

$12x + 9(2x) + 5(3x) = 15$ $6\left(\dfrac{1}{3}\right) = 2$ pounds

$$45x = 15$$
$$x = \frac{1}{3}$$

PTS: 2 REF: spr1305ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

22

355 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

356 ANS:

$$\frac{1}{2}x^2 - 4 = 0$$

$$x^2 - 8 = 0$$

$$x^2 = 8$$

$$x = \pm 2\sqrt{2}$$

PTS: 2   REF: fall1306ai   NAT: A.REI.B.4   TOP: Solving Quadratics
KEY: taking square roots