

JMAP

REGENTS AT RANDOM

NY Algebra 1 CCSS Regents Exam Questions
from Spring 2013 to January 2016 Sorted at Random

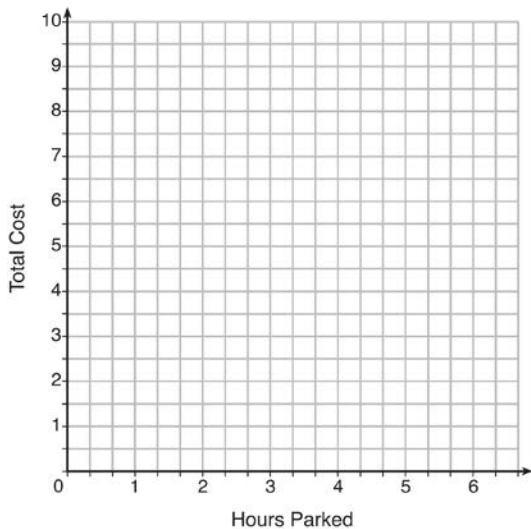
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Algebra I Common Core State Standards Regents at Random

- 1 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 up to and including 3.5 hours would cost \$5.75.

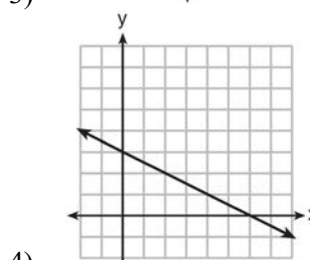
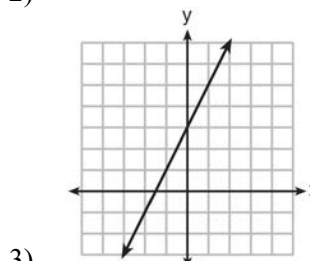
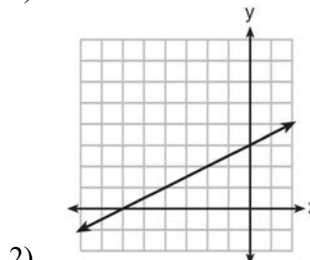
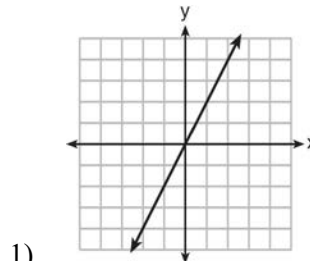
Hours Parked	Total Cost
1	1.25
2	2.50
3	4.00
4	5.75
5	7.75
6	10.00

Graph the step function that represents the cost for the number of hours parked.



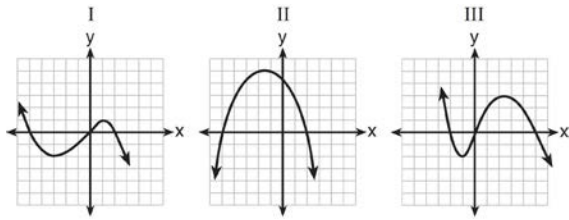
Explain how the cost per hour to park changes over the six-hour period.

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



- 3 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.

- 4 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
- 5 The value of the x -intercept for the graph of $4x - 5y = 40$ is

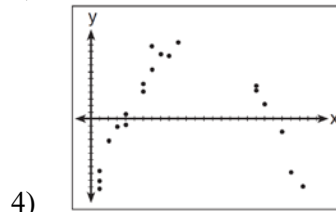
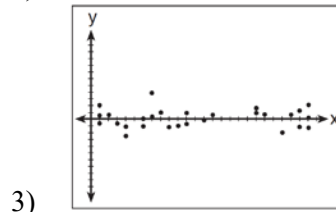
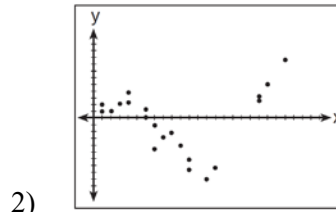
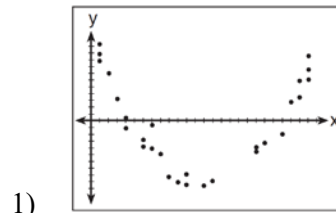
- 1) 10
 2) $\frac{4}{5}$
 3) $-\frac{4}{5}$
 4) -8

- 6 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.

- 7 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?



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

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

- 10 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) $(p + 3)(p - 3)(p + 3)(p - 3)$

- 11 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.

- 12 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.

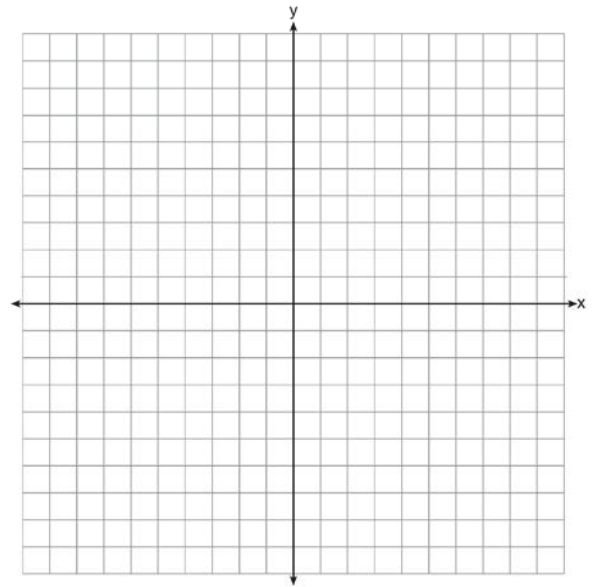
- 13 Krystal was given \$3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?
- 1) $3000(1 + 0.02)^{16}$
 - 2) $3000(1 - 0.02)^{16}$
 - 3) $3000(1 + 0.02)^{18}$
 - 4) $3000(1 - 0.02)^{18}$

- 14 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

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

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

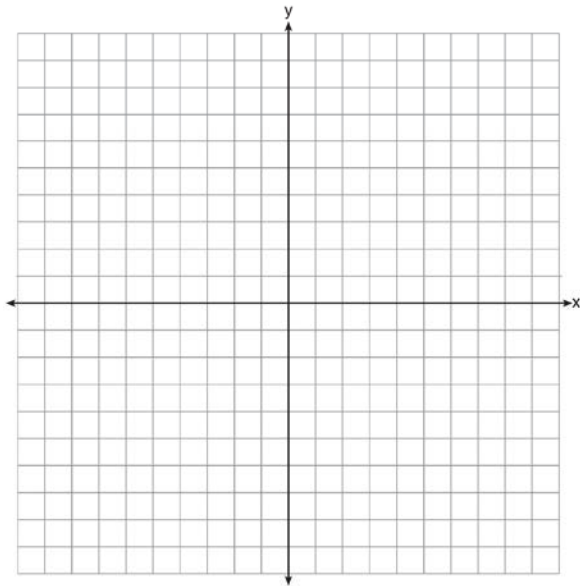
- 16 On the axes below, graph $f(x) = |3x|$.



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 $h(x)$?

- 17 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 $g(t)$.

- 18 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.]



- 19 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.

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

- 21 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

- 22 Given the following quadratic functions:

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

and

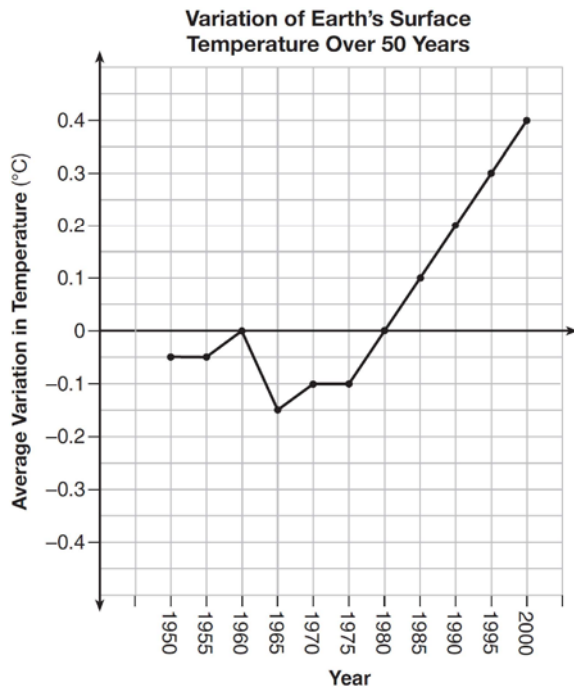
x	-3	-2	-1	0	1	2	3	4	5
$n(x)$	-7	0	5	8	9	8	5	0	-7

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 $g(x) = 0$.
- 23 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 $f(x) > 0$.

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

- 25 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.

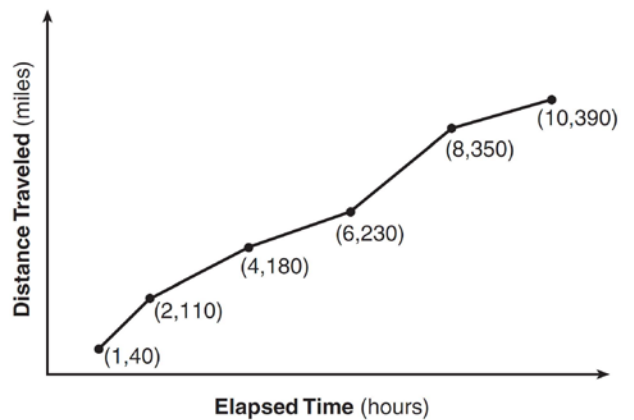
- 26 The equation to determine the weekly earnings of an employee at The Hamburger Shack is given by $w(x)$, where x is the number of hours worked.

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

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

- 27 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) $-2 \pm 4\sqrt{5}$

- 28 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
- 29 Which point is *not* on the graph represented by $y = x^2 + 3x - 6$?
- 1) $(-6, 12)$
 - 2) $(-4, -2)$
 - 3) $(2, 4)$
 - 4) $(3, -6)$

- 30 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?

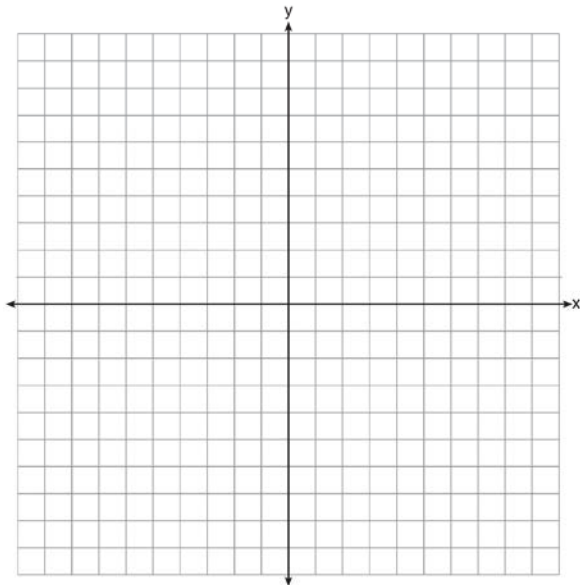
- 1) Both will increase.
 - 2) Only the median will increase.
 - 3) Only the mean will increase.
 - 4) Neither will change.
- 31 The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where a is acceleration due to gravity and t is the amount of time the object has fallen. What is t in terms of a and d ?
- 1) $t = \sqrt{\frac{da}{2}}$
 - 2) $t = \sqrt{\frac{2d}{a}}$
 - 3) $t = \left(\frac{da}{d}\right)^2$
 - 4) $t = \left(\frac{2d}{a}\right)^2$
- 32 If $f(1) = 3$ and $f(n) = -2f(n-1) + 1$, then $f(5) =$
- 1) -5
 - 2) 11
 - 3) 21
 - 4) 43

- 33 Which value of x satisfies the equation

$$\frac{7}{3} \left(x + \frac{9}{28} \right) = 20?$$

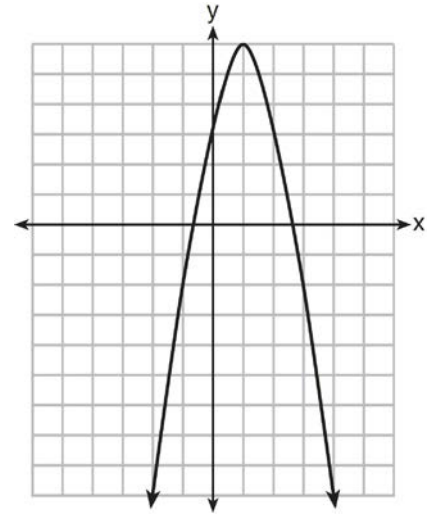
- 1) 8.25
 - 2) 8.89
 - 3) 19.25
 - 4) 44.92
- 34 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.
- 35 The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. The radius, r , of the cone may be expressed as
- 1) $\sqrt{\frac{3V}{\pi h}}$
 - 2) $\sqrt{\frac{V}{3\pi h}}$
 - 3) $3\sqrt{\frac{V}{\pi h}}$
 - 4) $\frac{1}{3}\sqrt{\frac{V}{\pi h}}$
- 36 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

- 37 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.
- 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.
 - 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.]
 - Marnie wants to go on five rides. Determine which carnival would have the lower total cost. Justify your answer.



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

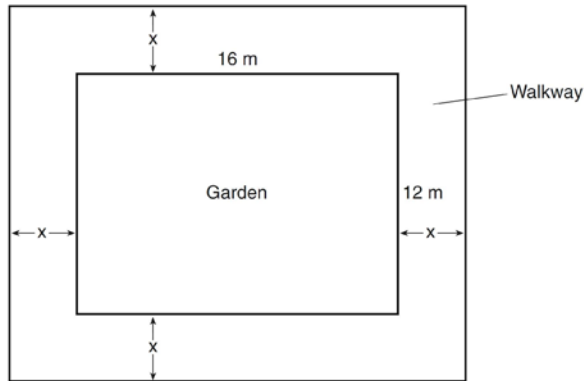
- 39 Let f be the function represented by the graph below.



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.

- 40 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?
- $\{\dots -2, -1, 0, 1, 2, 3, \dots\}$
 - $\{-2, -1, 0, 1, 2, 3\}$
 - $\{0, \frac{1}{2}, 1, 1\frac{1}{2}, 2, 2\frac{1}{2}\}$
 - $\{0, 1, 2, 3, \dots\}$

- 41 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.

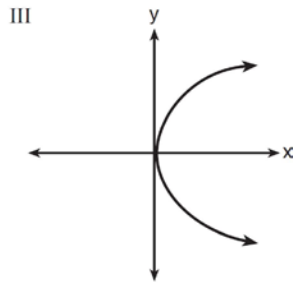


Write an equation that can be used to find x , the width of the walkway. Describe how your equation models the situation. Determine and state the width of the walkway, in meters.

- 42 Which representations are functions?

I

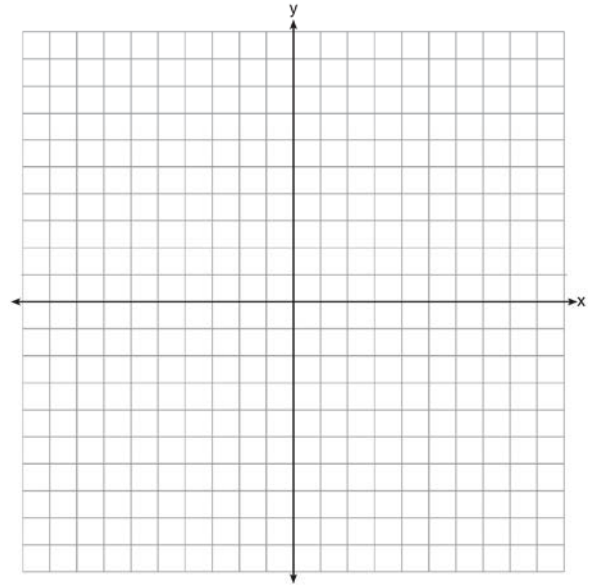
x	y
2	6
3	-12
4	7
5	5
2	-6



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

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

- 43 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.

- 44 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) $6x + 6y = 48$
 $6x + 2y = 8$

- 45 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) $y = 14.1x + 5.8$
- 46 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

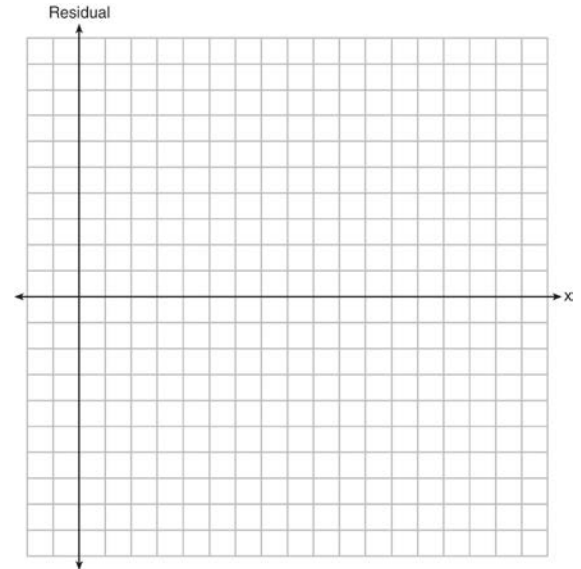
Which function would accurately model the technician's data?

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

- 47 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.



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

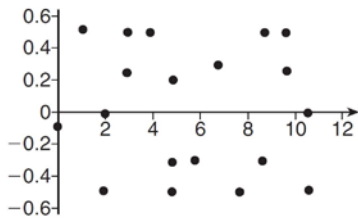
- 48 Connor wants to attend the town carnival. The price of admission to the carnival is \$4.50, and each ride costs an additional 79 cents. If he can spend at most \$16.00 at the carnival, which inequality can be used to solve for r , the number of rides Connor can go on, and what is the maximum number of rides he can go on?
- 1) $0.79 + 4.50r \leq 16.00$; 3 rides
 - 2) $0.79 + 4.50r \leq 16.00$; 4 rides
 - 3) $4.50 + 0.79r \leq 16.00$; 14 rides
 - 4) $4.50 + 0.79r \leq 16.00$; 15 rides

- 49 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.

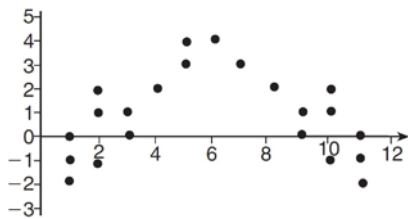
	1 Club	2 Clubs	3 or More Clubs
9 th	90	33	12
10 th	125	12	15
11 th	87	22	18
12 th	75	27	23

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

- 50 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.

- 51 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) $750 < p < 1500$

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

- 53 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?

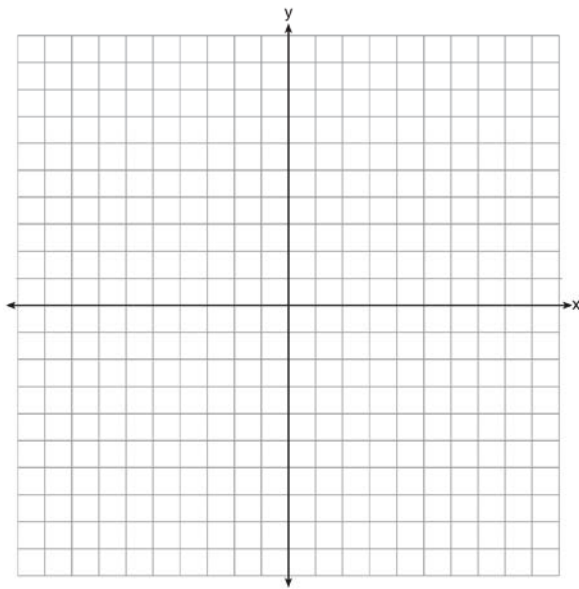
- 54 The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?

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

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

- 55 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) $x^2 + 12x + 9$

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

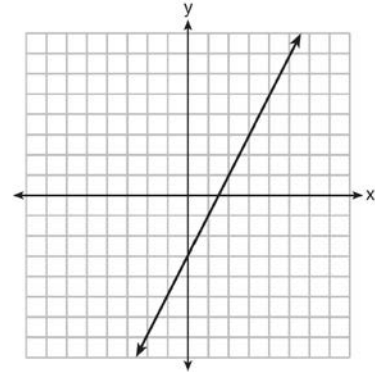


- 57 A student was given the equation $x^2 + 6x - 13 = 0$ to solve by completing the square. The first step that was written is shown below.

$$x^2 + 6x = 13$$

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.

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



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

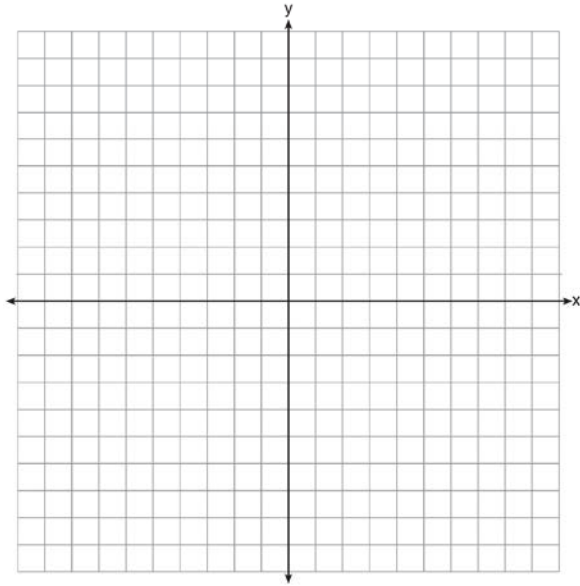
- 59 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	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.



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



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

- 61 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) $8x + 4y = 44$
 $-8x + 8y = -8$

- 62 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.

- 63 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

- 64 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.

- 65 The range of the function defined as $y = 5^x$ is

- 1) $y < 0$
- 2) $y > 0$
- 3) $y \leq 0$
- 4) $y \geq 0$

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

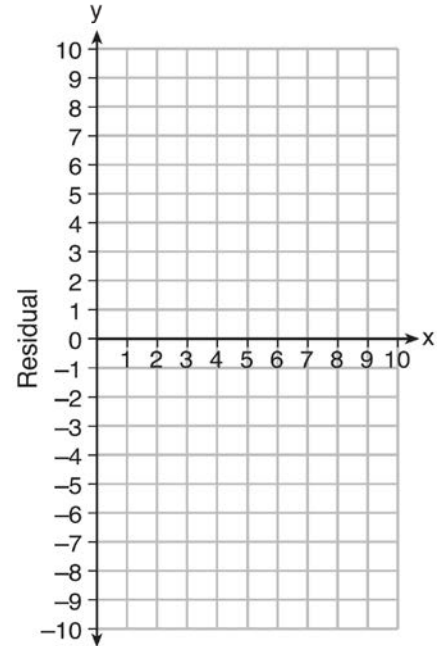
67 Factor the expression $x^4 + 6x^2 - 7$ completely.

68 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.

69 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) $3x^2 - 14x + 14$

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

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

- 71 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?

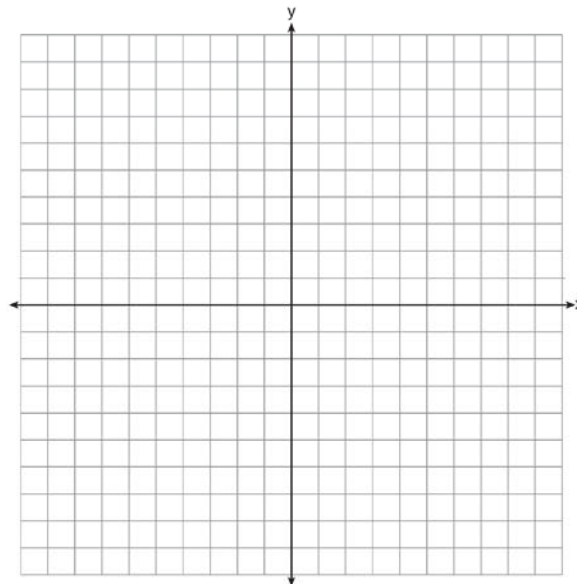
- 1) 2.4
 - 2) 0.04
 - 3) -2.4
 - 4) -0.04
- 72 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

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*?

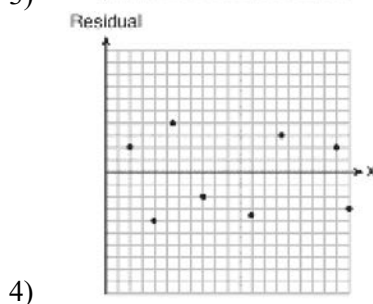
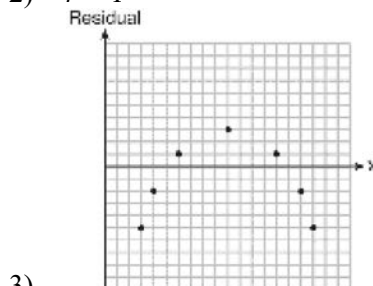
- 1) 4.3
- 2) 4.5
- 3) 5.4
- 4) 6.0

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

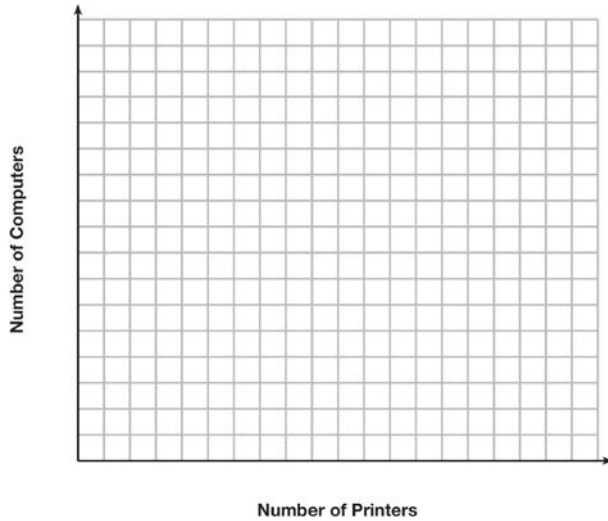


- 74 Which statistic would indicate that a linear function would *not* be a good fit to model a data set?

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



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



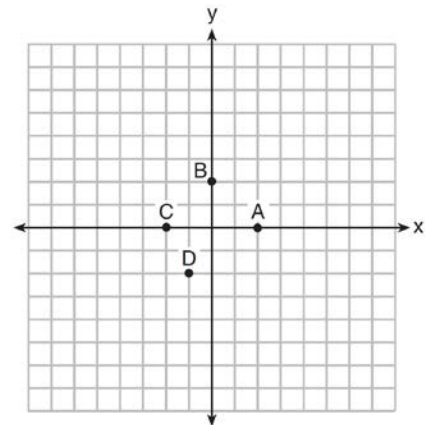
Determine a combination of printers and computers that would allow the electronics store to meet all of the constraints. Explain how you obtained your answer.

- 76 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

- 77 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.

- 78 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.

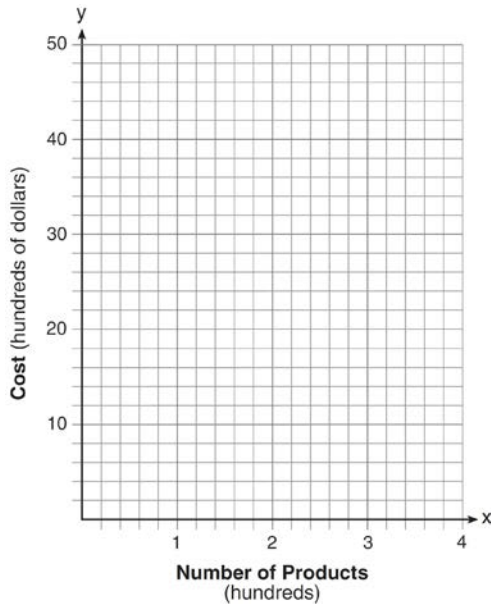
- 79 The graph of $y = f(x)$ is shown below.



Which point could be used to find $f(2)$?

- 1) A
- 2) B
- 3) C
- 4) D

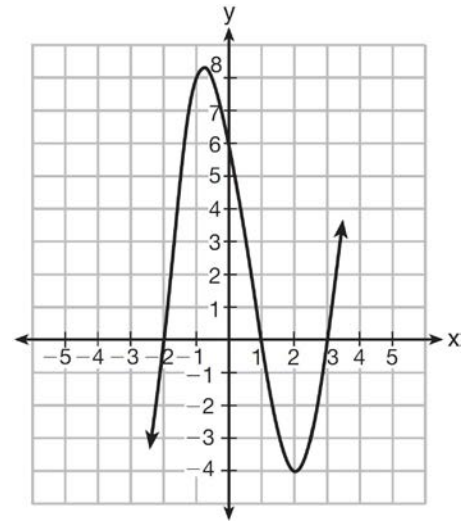
- 80 A company is considering building a manufacturing plant. They determine the weekly production cost at site A to be $A(x) = 3x^2$ while the production cost at site B is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds 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.

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

- 82 Which equation(s) represent the graph below?
- I $y = (x + 2)(x^2 - 4x - 12)$
 - II $y = (x - 3)(x^2 + x - 2)$
 - III $y = (x - 1)(x^2 - 5x - 6)$

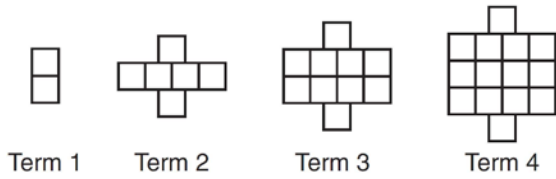


- 1) I, only
- 2) II, only
- 3) I and II
- 4) II and III

- 83 Michael borrows money from his uncle, who is charging him simple interest using the formula $I = Prt$. To figure out what the interest rate, r , is, Michael rearranges the formula to find r . His new formula is r equals

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

84 A pattern of blocks is shown below.

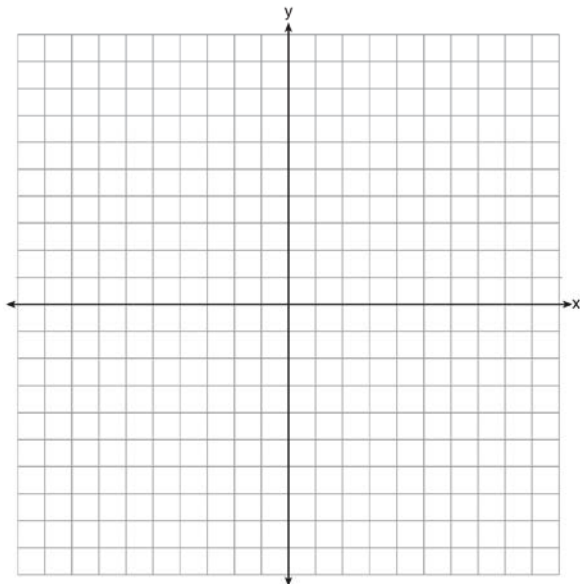


If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the n th term?

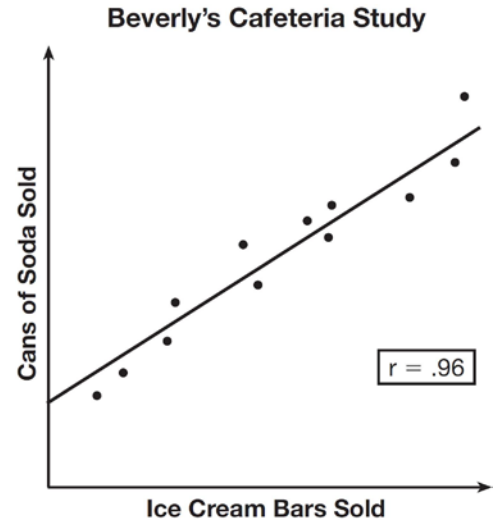
I	II	III
$a_n = n + 4$	$a_1 = 2$ $a_n = a_{n-1} + 4$	$a_n = 4n - 2$

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

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



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

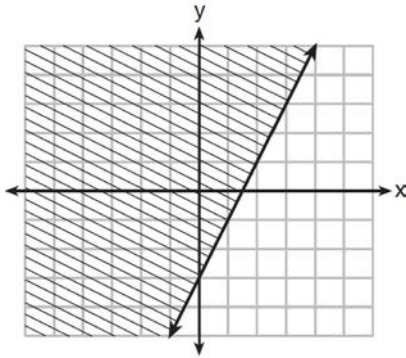


Given this information, which statement(s) can correctly be concluded?

- I. Eating more ice cream causes a person to become thirsty.
 - II. Drinking more soda causes a person to become hungry.
 - III. There is a strong correlation between ice cream sales and soda sales.
- 1) I, only
 - 2) III, only
 - 3) I and III
 - 4) II and III

87 The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Express b_1 in terms of A , h , and b_2 . The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

- 88 Which inequality is represented by the graph below?



- 1) $y \leq 2x - 3$
 2) $y \geq 2x - 3$
 3) $y \leq -3x + 2$
 4) $y \geq -3x + 2$
- 89 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) $c = 60 + 0.05d$
- 90 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*.

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

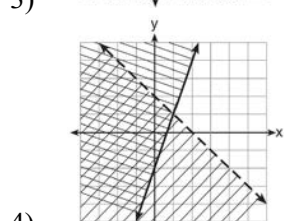
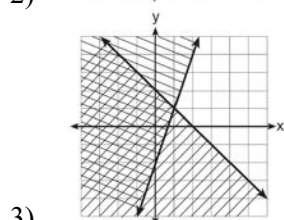
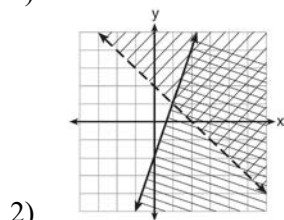
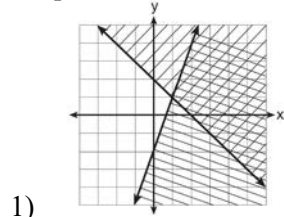
Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

- The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.
- 92 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
- 93 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.
- 94 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) $y = (x - 6)^2 - 2$

95 Given: $y + x > 2$

$$y \leq 3x - 2$$

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



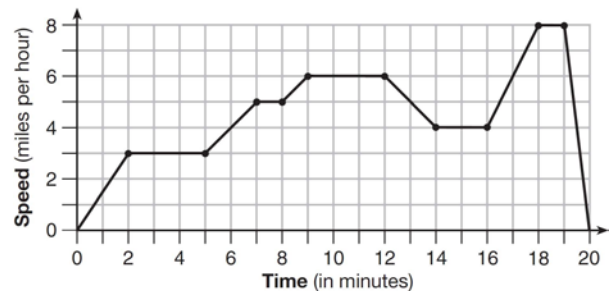
96 If $f(x) = 3^x$ and $g(x) = 2x + 5$, at which value of x is $f(x) < g(x)$?

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

97 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.

98 The graph below represents a jogger's speed during her 20-minute jog around her neighborhood.

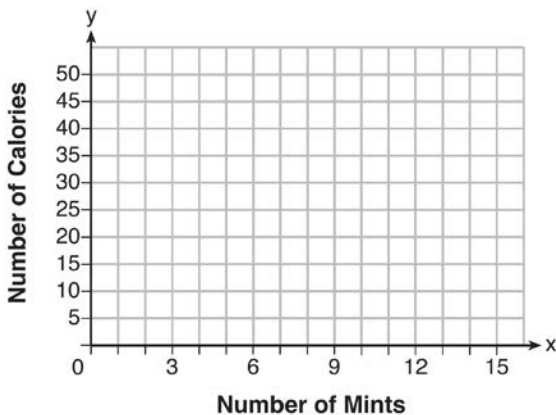


Which statement best describes what the jogger was doing during the 9 – 12 minute interval of her jog?

- 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.

- 99 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

- 100 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.



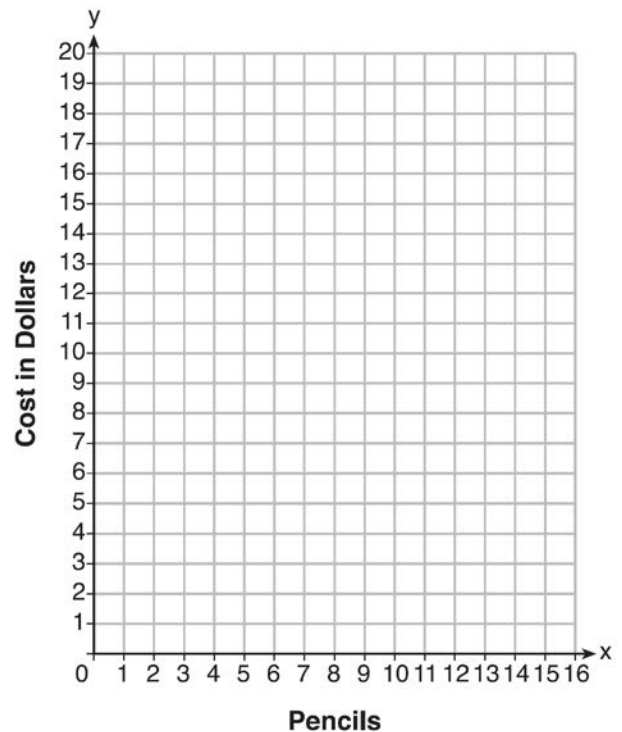
Write an equation that represents $C(x)$. A full box of mints contains 180 Calories. Use the equation to determine the total number of mints in the box.

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

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

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

Create a graph of c on the axes below.



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

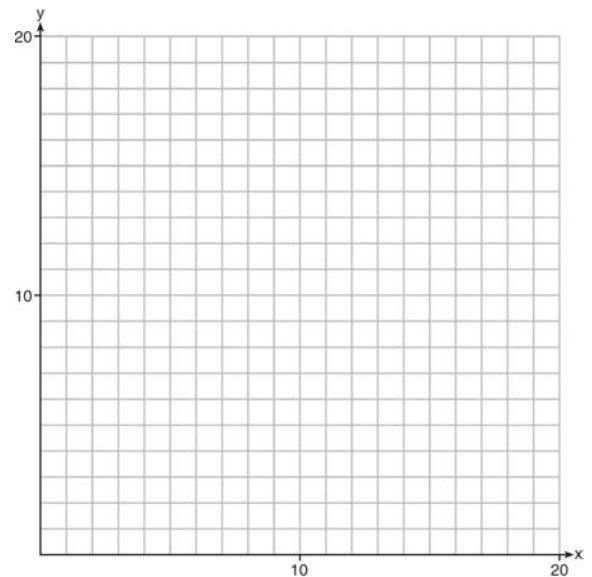
- 103 Grisham is considering the three situations below.
- I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.
 - II. The value of a car depreciates at a rate of 15% per year after it is purchased.
 - III. The amount of bacteria in a culture triples every two days during an experiment.
- 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

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

- 105 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) $6x^2 - 6x - 11$

- 106 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%

- 107 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.

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

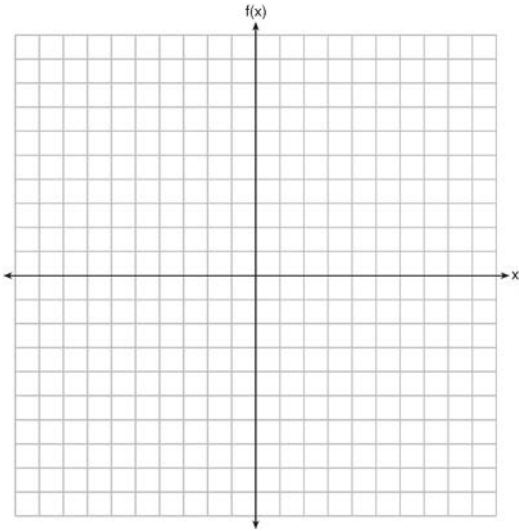
Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, $B(x)$	220	280	350	440	550	690	860	1070	1340	1680

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.

- 109 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.
- 110 In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when x is
- 1) -2
 - 2) 2
 - 3) -4
 - 4) 4
- 111 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
- 112 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
- 113 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.

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

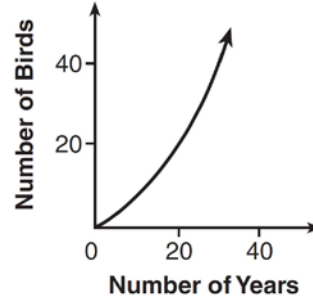
$$f(x) = \begin{cases} |x|, & -3 \leq x < 1 \\ 4, & 1 \leq x \leq 8 \end{cases}$$



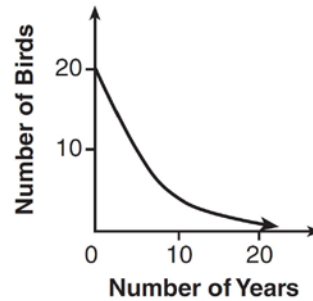
- 115 If Lylah completes the square for $f(x) = x^2 - 12x + 7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x) = (x - a)^2 + b$. What is the value of a for $f(x)$?
- 1) 6
 - 2) -6
 - 3) 12
 - 4) -12

- 116 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

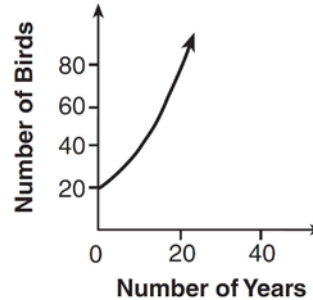
117 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?



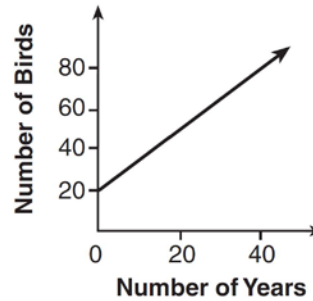
1)



2)



3)

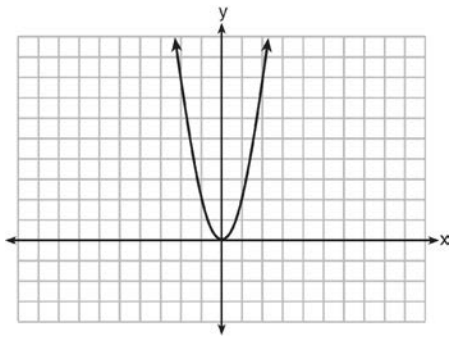


4)

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

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



If a is multiplied by $-\frac{1}{2}$, the graph of the new equation is

- 1) wider and opens downward
- 2) wider and opens upward
- 3) narrower and opens downward
- 4) narrower and opens upward

120 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.

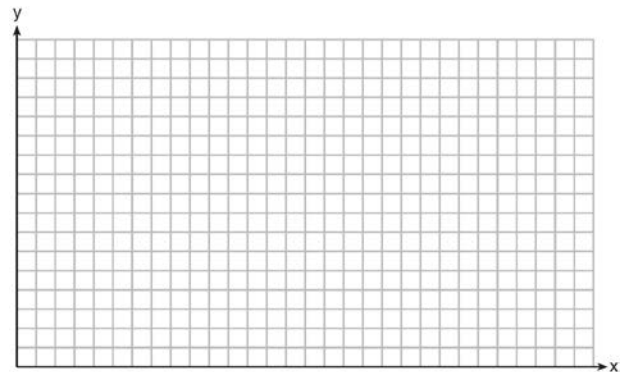
121 Four expressions are shown below.

- 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

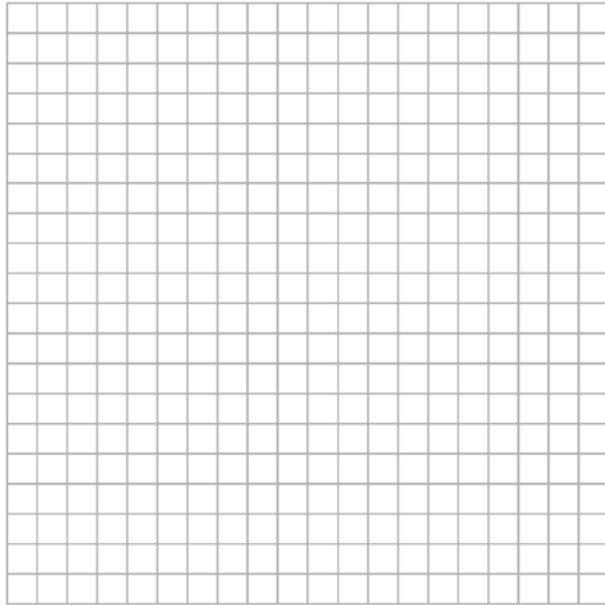
- 1) I and II, only
- 2) II and IV, only
- 3) I, II, and IV
- 4) II, III, and IV

122 A football player attempts to kick a football over a goal post. The path of the football can be modeled by the function $h(x) = -\frac{1}{225}x^2 + \frac{2}{3}x$, where x is the horizontal distance from the kick, and $h(x)$ is the height of the football above the ground, when both are measured in feet. On the set of axes below, graph the function $y = h(x)$ over the interval $0 \leq x \leq 150$.



Determine the vertex of $y = h(x)$. Interpret the meaning of this vertex in the context of the problem. The goal post is 10 feet high and 45 yards away from the kick. Will the ball be high enough to pass over the goal post? Justify your answer.

- 123 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?

- 124 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) $(2x + 3)(x - 1) = 0$

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

- 126 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.

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

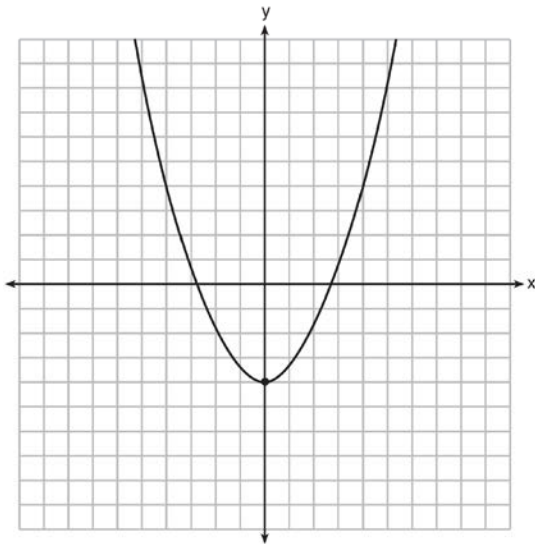
- 1) $P = \frac{1}{\sqrt{3}}$ and $W = \frac{1}{\sqrt{6}}$
- 2) $P = \frac{1}{\sqrt{4}}$ and $W = \frac{1}{\sqrt{9}}$
- 3) $P = \frac{1}{\sqrt{6}}$ and $W = \frac{1}{\sqrt{10}}$
- 4) $P = \frac{1}{\sqrt{25}}$ and $W = \frac{1}{\sqrt{2}}$

- 128 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

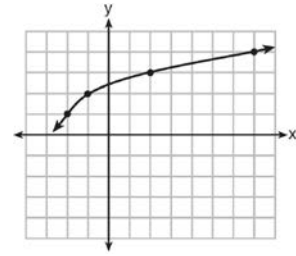
State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the *nearest hundredth*. State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

- 129 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.

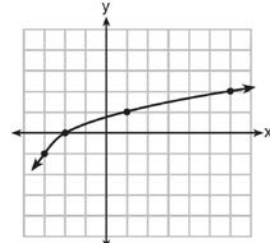


Find the zeros in simplest radical form.

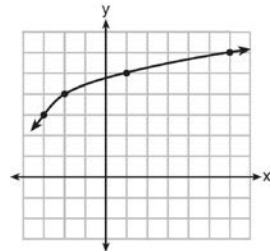
- 130 The graph of $y = f(x)$ is shown below.



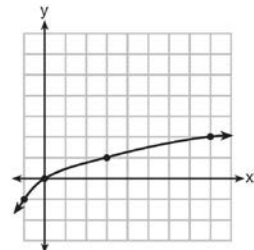
What is the graph of $y = f(x + 1) - 2$?



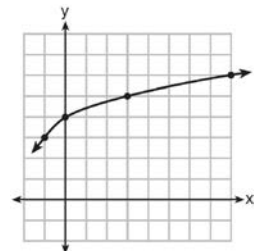
1)



2)



3)



4)

131 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

132 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) $-3 \pm 4\sqrt{14}$

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

$$M = 3\sqrt{3}$$

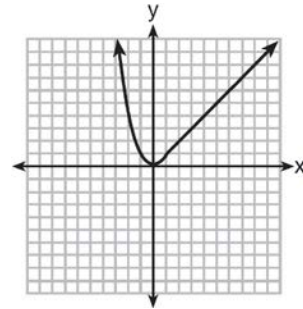
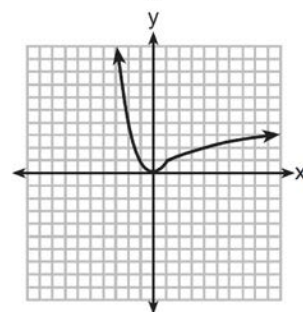
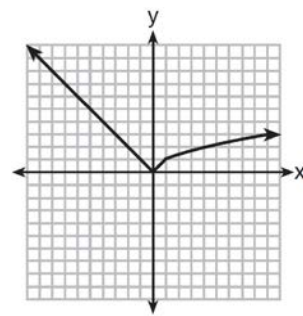
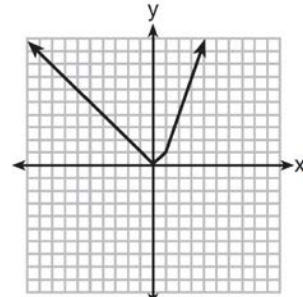
$$N = \sqrt{16}$$

$$P = \sqrt{9}$$

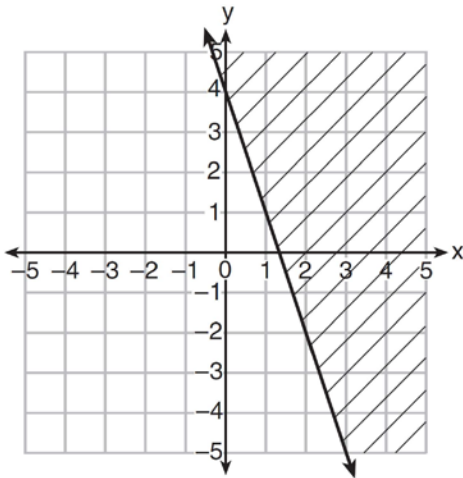
Which expression results in a rational number?

- 1) $L + M$
- 2) $M + N$
- 3) $N + P$
- 4) $P + L$

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



- 135 Which inequality is represented in the graph below?



- 1) $y \geq -3x + 4$
 2) $y \leq -3x + 4$
 3) $y \geq -4x - 3$
 4) $y \leq -4x - 3$
- 136 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.
- 137 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.

- 138 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.
- 139 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.]
- 140 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) $5x^2 - x + 1$
- 141 The function $h(t) = -16t^2 + 144$ represents the height, $h(t)$, in feet, of an object from the ground at t seconds after it is dropped. A realistic domain for this function is
- 1) $-3 \leq t \leq 3$
 - 2) $0 \leq t \leq 3$
 - 3) $0 \leq h(t) \leq 144$
 - 4) all real numbers

142 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

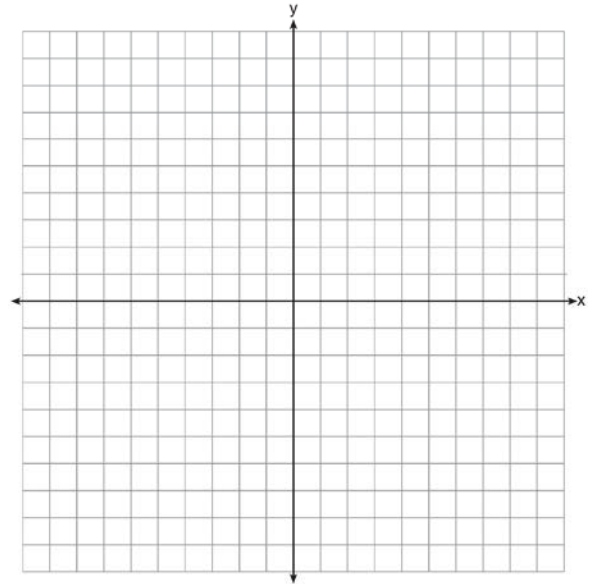
143 An animal shelter spends \$2.35 per day to care for each cat and \$5.50 per day to care for each dog. Pat noticed that the shelter spent \$89.50 caring for cats and dogs on Wednesday. Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday. 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?

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

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

146 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) $F(x) = 2x + 3$

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

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

149 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.

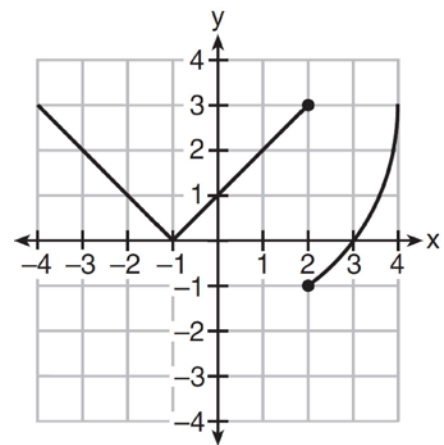
150 The cost of a pack of chewing gum in a vending machine is \$0.75. The cost of a bottle of juice in the same machine is \$1.25. Julia has \$22.00 to spend on chewing gum and bottles of juice for her team and she must buy seven packs of chewing gum. If b represents the number of bottles of juice, which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

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

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

152 Marcel claims that the graph below represents a function.

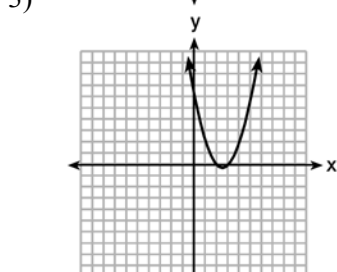
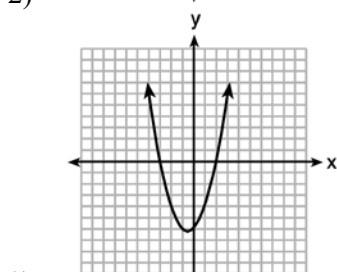
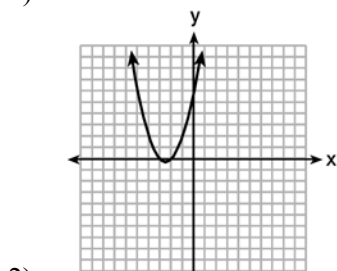
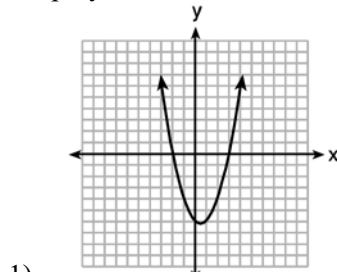


State whether Marcel is correct. Justify your answer.

153 The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is a_1 , which is an equation for the n th term of this sequence?

- 1) $a_n = 8n + 10$
- 2) $a_n = 8n - 14$
- 3) $a_n = 16n + 10$
- 4) $a_n = 16n - 38$

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



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

- 156 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
- 157 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*.)

- 158 What is the value of x in the equation

$$\frac{x-2}{3} + \frac{1}{6} = \frac{5}{6}?$$

- 1) 4
- 2) 6
- 3) 8
- 4) 11

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

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

- 160 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) $m + f = 3.95$
 $f + 0.005 = m$

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

- 162 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) $3.00a + 1.50s$

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

- 164 Given the following expressions:

$$\begin{array}{ll} \text{I. } -\frac{5}{8} + \frac{3}{5} & \text{III. } (\sqrt{5}) \cdot (\sqrt{5}) \\ \text{II. } \frac{1}{2} + \sqrt{2} & \text{IV. } 3 \cdot (\sqrt{49}) \end{array}$$

Which expression(s) result in an irrational number?

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

- 165 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.

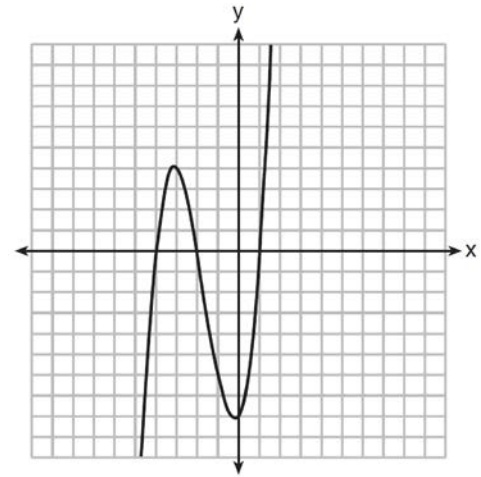
- 166 A student is asked to solve the equation $4(3x - 1)^2 - 17 = 83$. The student's solution to the problem starts as $4(3x - 1)^2 = 100$

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

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) $9x^2 - 6x + 1 = 5$
- 167 Solve $8m^2 + 20m = 12$ for m by factoring.
- 168 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) $(15)(18) = 120 + x^2$

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

- 170 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

- 171 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.

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

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

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

- 1) $\frac{3 \text{ ft}}{1 \text{ yd}}$
 - 2) $\frac{5280 \text{ ft}}{1 \text{ mi}}$
 - 3) $\frac{60 \text{ sec}}{1 \text{ min}}$
 - 4) $\frac{60 \text{ min}}{1 \text{ hr}}$
- 173 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
- 174 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*.

- 175 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 $f(0) = 3$

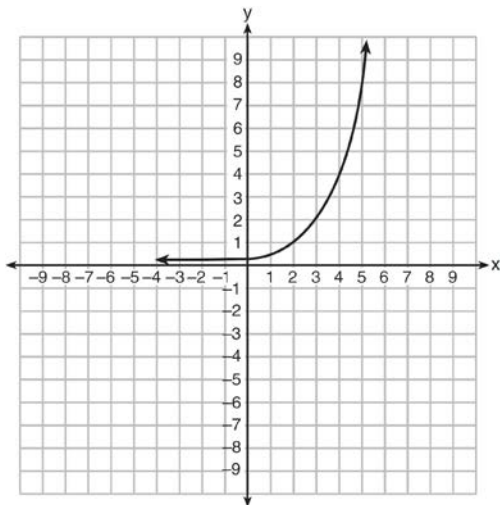
- 1) I and II
 - 2) II, only
 - 3) III, only
 - 4) I and III
- 176 The function, $t(x)$, is shown in the table below.

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.

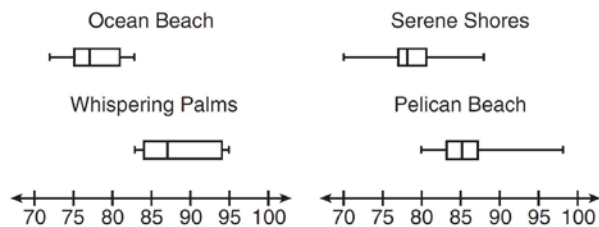
- 177 If $4x^2 - 100 = 0$, the roots of the equation are
- 1) -25 and 25
 - 2) -25, only
 - 3) -5 and 5
 - 4) -5, only
- 178 Rhonda deposited \$3000 in an account in the Merrick National Bank, earning 4.2% interest, compounded annually. She made no deposits or withdrawals. Write an equation that can be used to find B , her account balance after t years.

- 179 Write an exponential equation for the graph shown below.



Explain how you determined the equation.

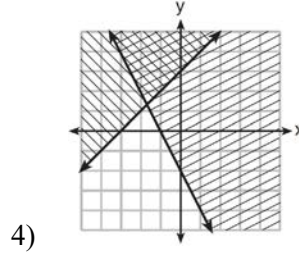
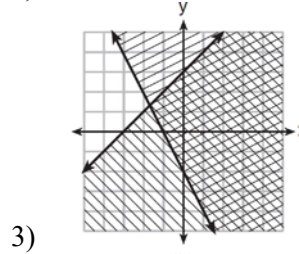
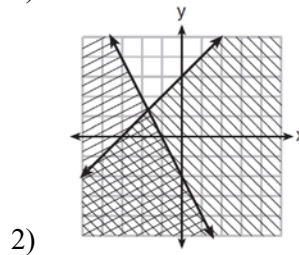
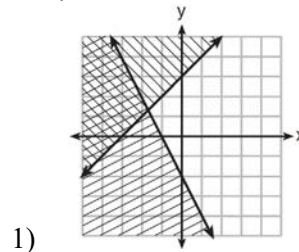
- 180 Corinne is planning a beach vacation in July and is analyzing the daily high temperatures for her potential destination. She would like to choose a destination with a high median temperature and a small interquartile range. She constructed box plots shown in the diagram below.



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

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



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

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

184 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.

185 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

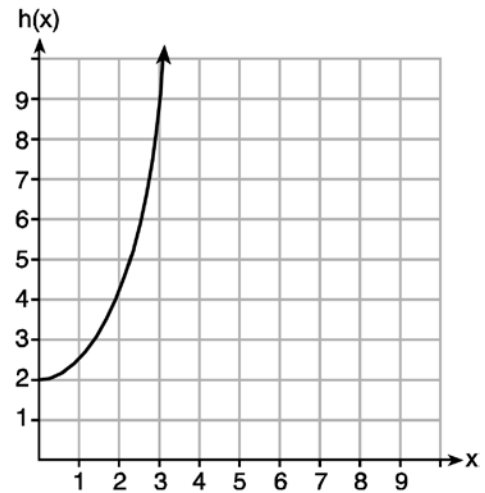
186 The length of the shortest side of a right triangle is 8 inches. The lengths of the other two sides are represented by consecutive odd integers. Which equation could be used to find the lengths of the other sides of the triangle?

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

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

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

x	f(x)
0	1
1	2
2	5
3	7



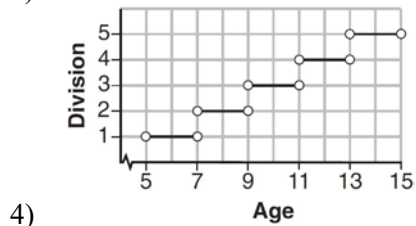
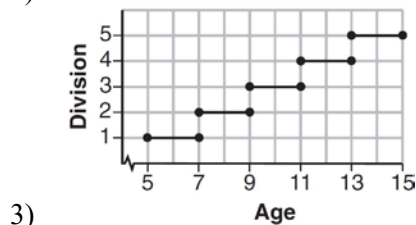
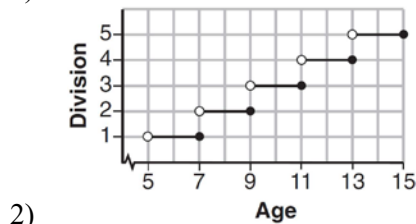
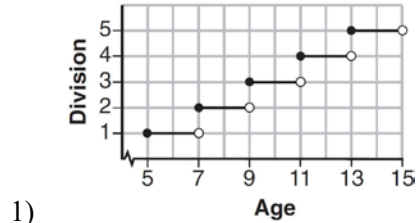
The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \leq x \leq 3$ is

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

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

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

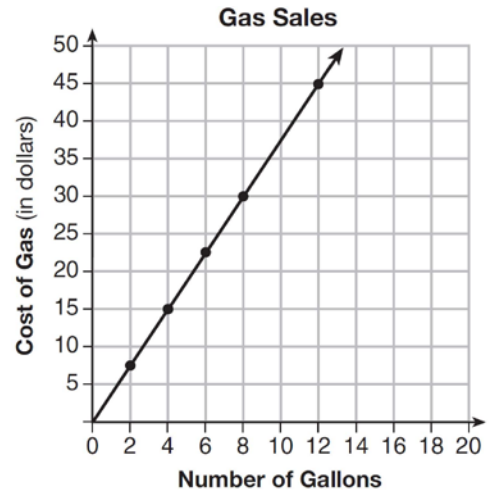
189 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?



190 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

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



Which statement can be justified by using the graph?

- 1) If 10 gallons of gas was purchased, \$35 was paid.
- 2) For every gallon of gas purchased, \$3.75 was paid.
- 3) For every 2 gallons of gas purchased, \$5.00 was paid.
- 4) If zero gallons of gas were purchased, zero miles were driven.

192 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.

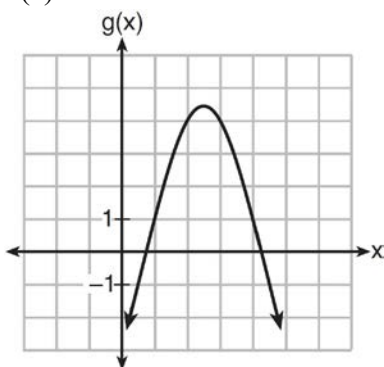
- 193 Let f be a function such that $f(x) = 2x - 4$ is defined on the domain $2 \leq x \leq 6$. The range of this function is
- 1) $0 \leq y \leq 8$
 - 2) $0 \leq y < \infty$
 - 3) $2 \leq y \leq 6$
 - 4) $-\infty < y < \infty$

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



4)

- 195 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.

- 196 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.

- 197 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.

198 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.

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

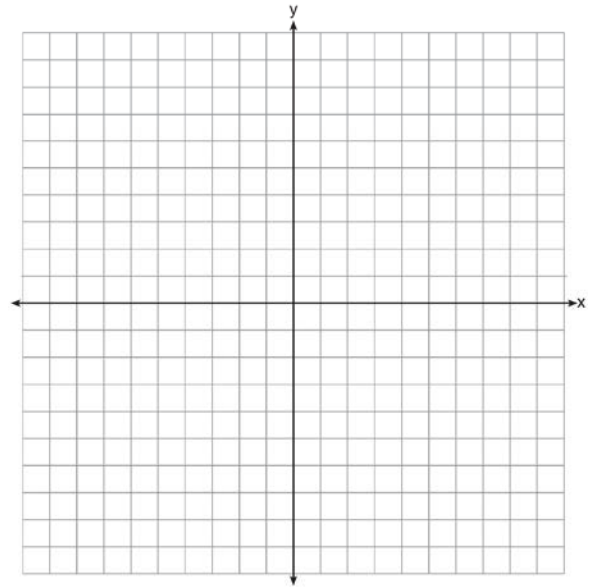
200 Which function is shown in the table below?

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) $f(x) = 3^x$

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

202 Graph the function $y = |x - 3|$ on the set of axes below.



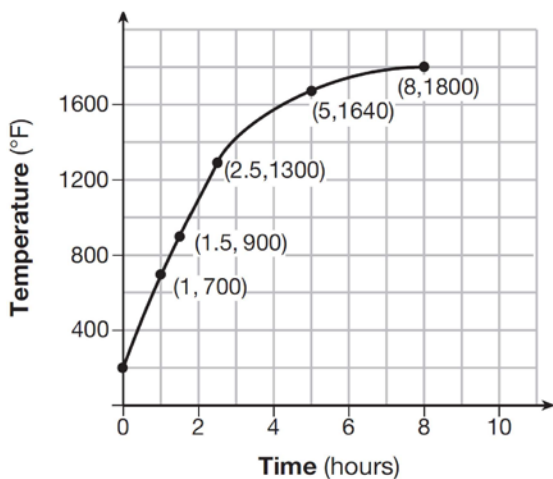
Explain how the graph of $y = |x - 3|$ has changed from the related graph $y = |x|$.

203 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.

- 204 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

- 205 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?

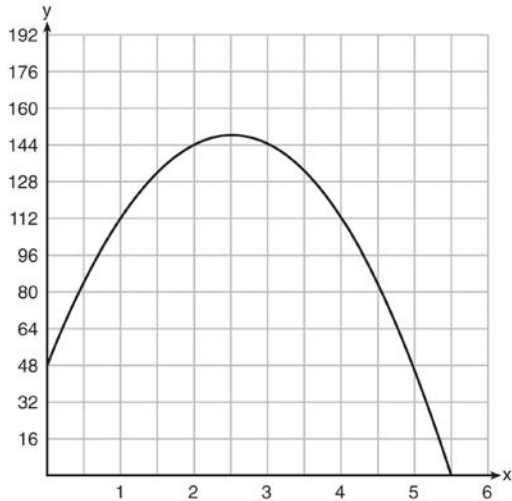
- 1) 0 to 1 hour
- 2) 1 hour to 1.5 hours
- 3) 2.5 hours to 5 hours
- 4) 5 hours to 8 hours

- 206 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) $0.05(4x) + 0.10(x) = \$1.25$
- 207 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.

- 208 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.

- 209 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

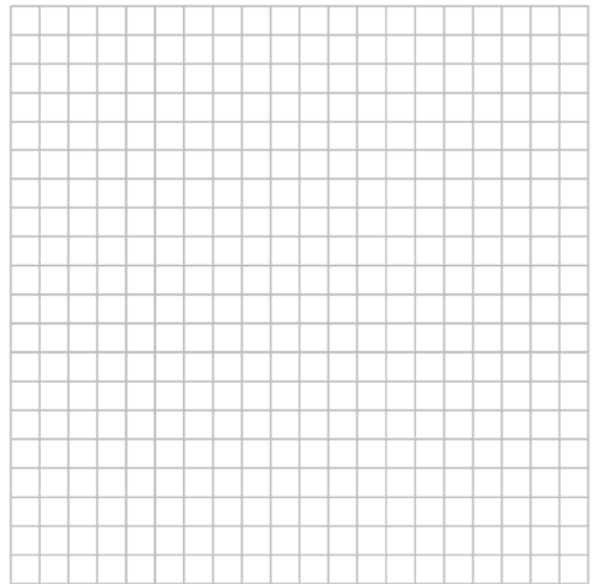
- 210 A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, y , of the ball from the ground after x seconds.



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

- 1) $0 \leq x \leq 2.5$
 - 2) $0 < x < 5.5$
 - 3) $2.5 < x < 5.5$
 - 4) $x \geq 2$
- 211 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*.
- 212 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) $x(x - 2)(x + 15)$

- 213 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.



- 214 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

215 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

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

217 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?

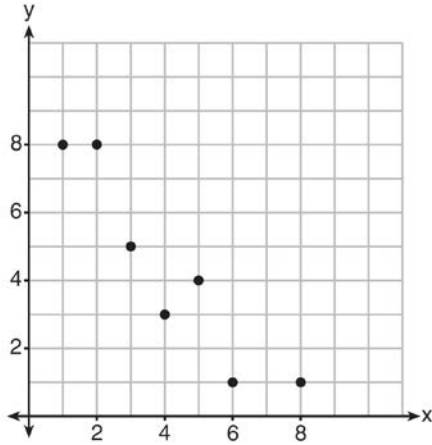
- 1) 32
- 2) 16
- 3) 8
- 4) 4

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

219 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*.

220 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

221 Christopher looked at his quiz scores shown below for the first and second semester of his Algebra class.

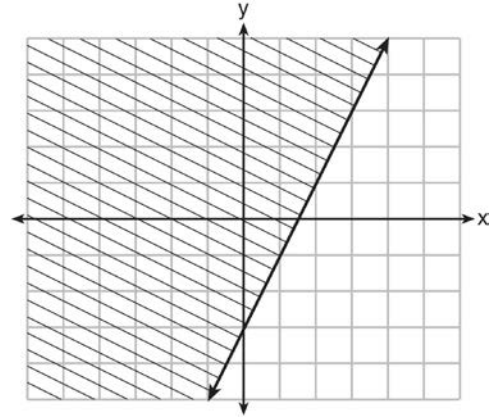
Semester 1: 78, 91, 88, 83, 94

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.

222 The graph of an inequality is shown below.



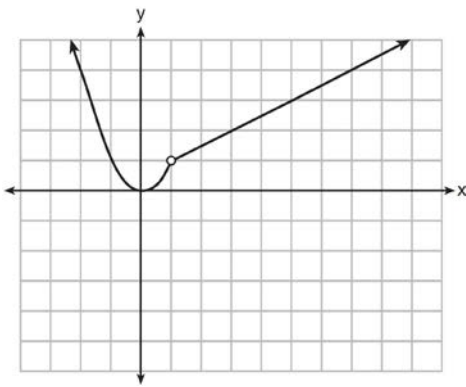
- a) Write the inequality represented by the graph.
- b) On the same set of axes, graph the inequality $x + 2y < 4$.
- c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point $(2, 1)$ is in the solution set for this system of inequalities. Determine and state whether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

223 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

- 224 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

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



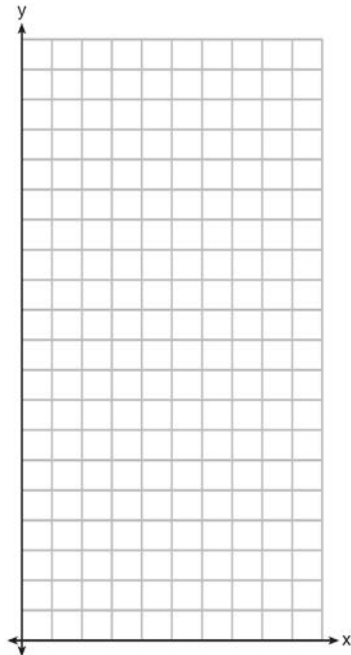
Which function is related to the graph?

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

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

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

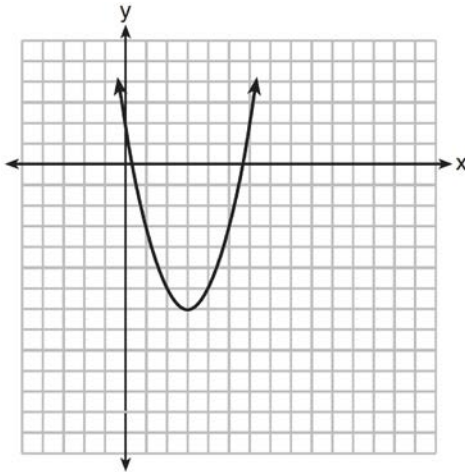
- 227 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



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

- 228 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.

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

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

231 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.

232 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

233 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

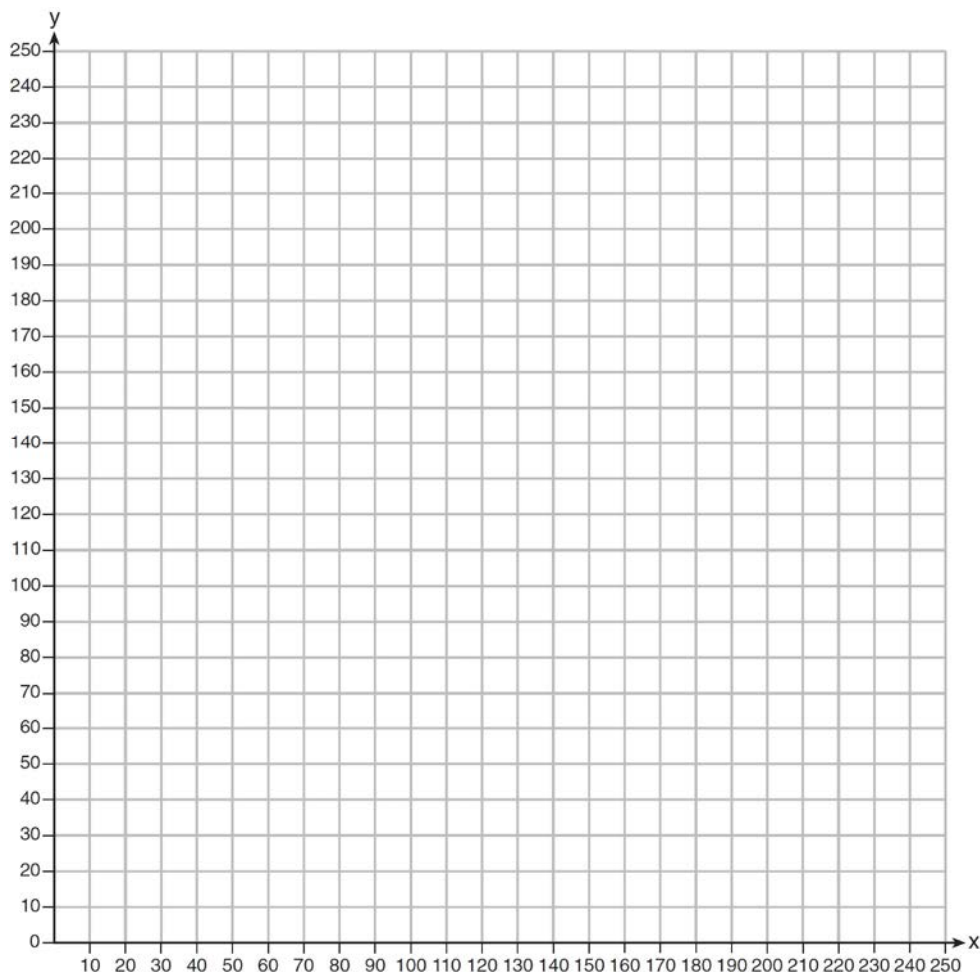
- 1) 1
- 2) -11
- 3) 5
- 4) 17

234 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.

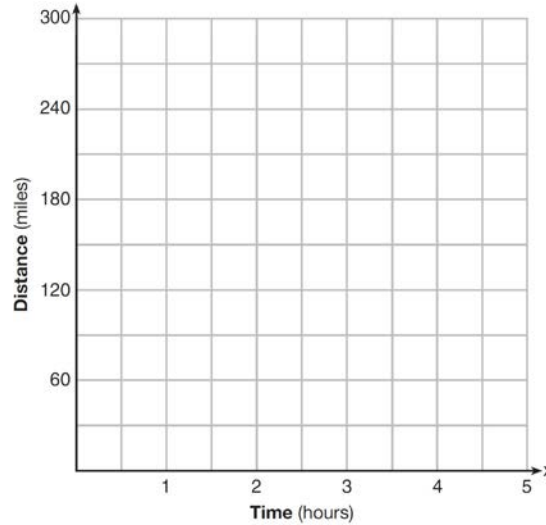
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- 235 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater. Write a system 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.



- 236 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.



- 237 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.

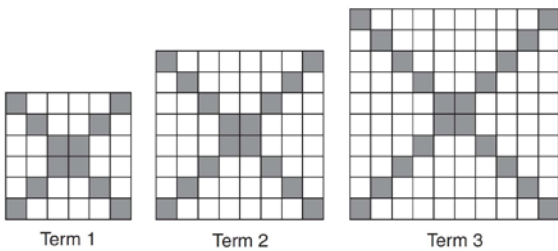
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, $f(t)$	\$2900	\$3080	\$2500	\$2380	\$2200	\$2700	\$3000	\$3620	\$3720

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.

238 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) $-7 \pm \sqrt{3}$

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



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

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

240 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) $(2, 9)$

241 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

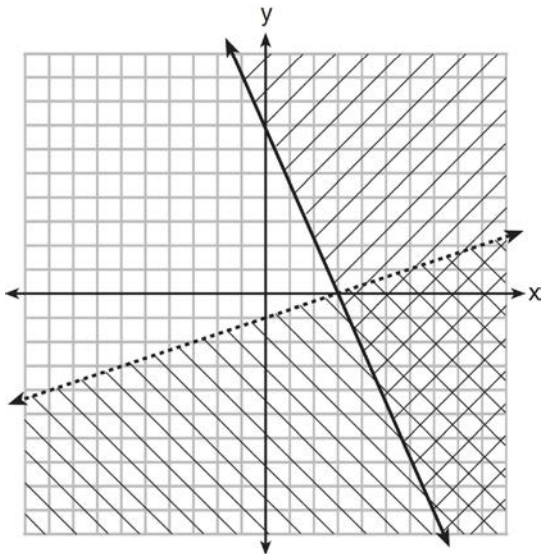
Which statement is true about these data?

- 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.

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

243 What is one point that lies in the solution set of the system of inequalities graphed below?

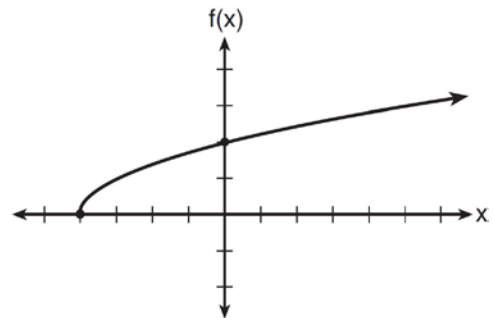


- 1) (7, 0)
- 2) (3, 0)
- 3) (0, 7)
- 4) (-3, 5)

244 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

245 The graph of the function $f(x) = \sqrt{x+4}$ is shown below.

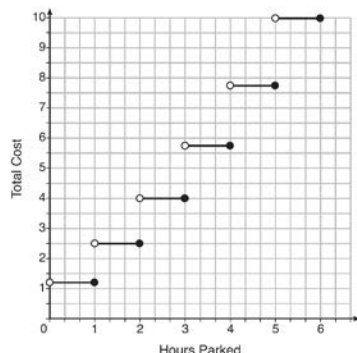


The domain of the function is

- 1) $\{x | x > 0\}$
- 2) $\{x | x \geq 0\}$
- 3) $\{x | x > -4\}$
- 4) $\{x | x \geq -4\}$

Algebra I Common Core State Standards Regents at Random Answer Section

1 ANS:



The cost for each additional hour increases after the first 2 hours.

PTS: 4 REF: fall1311ai NAT: F.IF.7 TOP: Graphing Step Functions

2 ANS: 2 PTS: 2 REF: 081413ai NAT: A.CED.2

TOP: Graphing Linear Functions KEY: bimodalgraph

3 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.1 TOP: Geometric Applications of Quadratics

4 ANS: 1 PTS: 2 REF: 011524ai NAT: A.APR.3

TOP: Zeros of Polynomials

5 ANS: 1

$$4x - 5(0) = 40$$

$$4x = 40$$

$$x = 10$$

PTS: 2 REF: 081408ai NAT: F.IF.4 TOP: Graphing Linear Functions

6 ANS:

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

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

KEY: exponential

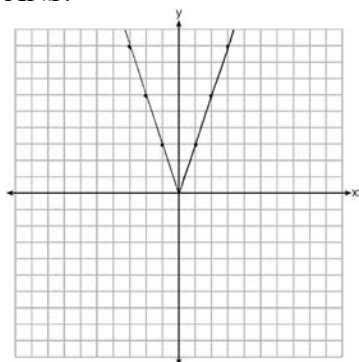
7 ANS: 3

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.6 TOP: Correlation Coefficient and Residuals

- 8 ANS: 3 PTS: 2 REF: 061412ai NAT: A.SSE.3
TOP: Solving Quadratics KEY: zeros of polynomials
- 9 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.3 TOP: Solving Linear Inequalities
- 10 ANS: 3 PTS: 2 REF: 011522ai NAT: A.SSE.2
TOP: Factoring the Difference of Perfect Squares
- 11 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.1 TOP: Geometric Applications of Quadratics
- 12 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.5 TOP: Modeling Exponential Functions
- 13 ANS: 1 PTS: 2 REF: 011504ai NAT: F.BF.1
TOP: Modeling Exponential Functions
- 14 ANS:
 $2(-1) + a(-1) - 7 > -12 \quad a = 2$
 $-a - 9 > -12$
 $-a > -3$
 $a < 3$
- PTS: 2 REF: 061427ai NAT: A.REI.3 TOP: Interpreting Solutions
- 15 ANS:
 $6. 3x + 9 \leq 5x - 3$
 $12 \leq 2x$
 $6 \leq x$
- PTS: 2 REF: 081430ai NAT: A.REI.3 TOP: Interpreting Solutions

16 ANS:



2 down. 4 right.

PTS: 4

REF: 081433ai

NAT: F.BF.3

TOP: Graphing Absolute Value Functions

17 ANS:

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

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

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

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

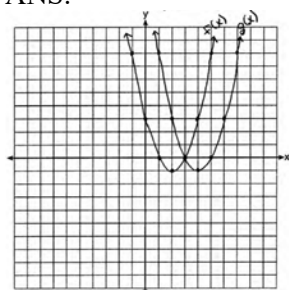
PTS: 2

REF: 011632ai

NAT: A.SSE.3

TOP: Exponential Equations

18 ANS:

(4, -1). $f(x - 2)$ is a horizontal shift two units to the right.

PTS: 2

REF: 061428ai

NAT: F.BF.3

TOP: Graphing Quadratic Functions

19 ANS:

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

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

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

$$y = 6 \quad 8x = -6$$

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

$$8x = -6$$

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

PTS: 4

REF: 061533ai

NAT: A.REI.5

TOP: Solving Linear Systems

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.4 TOP: Solving Quadratics
KEY: factoring

21 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.6 TOP: Rate of Change

22 ANS: 4

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

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

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

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

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

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

24 ANS:

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

$$-8x < 8$$

$$x > -1$$

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

25 ANS:

During 1960-1965 the graph has the steepest slope.

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

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

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

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

$$200 \qquad x = 43$$

for x .

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

27 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.4 TOP: Solving Quadratics
KEY: completing the square

28 ANS: 1

$$\frac{110 - 40}{2 - 1} > \frac{350 - 230}{8 - 6}$$

$$70 > 60$$

PTS: 2 REF: 061418ai NAT: F.IF.6 TOP: Rate of Change
29 ANS: 4 PTS: 2 REF: 081405ai NAT: A.REI.10
TOP: Identifying Solutions30 ANS: 3
Median remains at 1.4.PTS: 2 REF: 061520ai NAT: S.ID.3 TOP: Central Tendency and Dispersion
KEY: outliers

31 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.4 TOP: Transforming Formulas

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

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

33 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.3 TOP: Solving Linear Equations
 KEY: fractional expressions

34 ANS:
 $-16t^2 + 64t = 0 \quad 0 \leq t \leq 4$ The rocket launches at $t = 0$ and lands at $t = 4$
 $-16t(t - 4) = 0$
 $t = 0, 4$

PTS: 2 REF: 081531ai NAT: F.IF.4 TOP: Graphing Quadratic Functions

35 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.4 TOP: Transforming Formulas

36 ANS: 4
 $(x + 2)^2 - 25 = 0$

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

$$x = -7, 3$$

PTS: 2 REF: 081418ai NAT: A.APR.3 TOP: Zeros of Polynomials

37 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.

$$B(x) = 2x + 2.50 \quad .50x = 3.50 \quad B(x) = 2(5) + 2.50 = 12.50$$

$$x = 7$$

PTS: 6 REF: spr1308ai NAT: A.REI.6 TOP: Graphing Linear Systems

38 ANS: 1

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

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

$$-6 = 3x$$

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

$$6 = x$$

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

39 ANS:

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

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

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

40 ANS: 4

There are no negative or fractional cars.

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

41 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.1 TOP: Geometric Applications of Quadratics

42 ANS: 2

PTS: 2

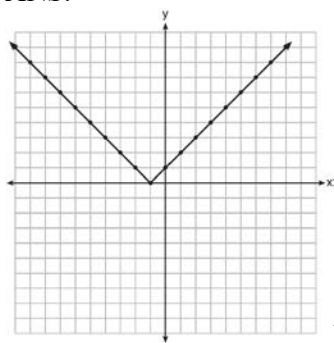
REF: 081511ai

NAT: F.IF.1

TOP: Defining Functions

KEY: mixed

43 ANS:



Range: $y \geq 0$. The function is increasing for $x > -1$.

PTS: 4

REF: fall1310ai

NAT: F.IF.7

TOP: Graphing Absolute Value Functions

44 ANS: 2

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

$$6x - 2y = 8$$

PTS: 2

REF: 061414ai

NAT: A.REI.5

TOP: Solving Linear Systems

45 ANS: 4

PTS: 2

REF: 081421ai

NAT: S.ID.6

TOP: Regression

KEY: linear

46 ANS: 2

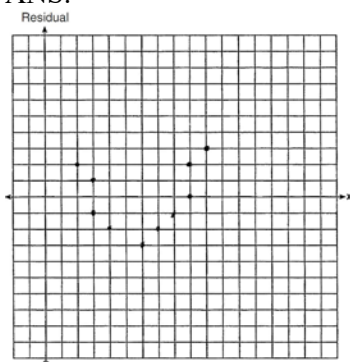
PTS: 2

REF: 061513ai

NAT: F.LE.2

TOP: Families of Functions

47 ANS:



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

PTS: 2

REF: 081431ai

NAT: S.ID.6

TOP: Correlation Coefficient and Residuals

48 ANS: 3

PTS: 2

REF: 011513ai

NAT: A.CED.1

TOP: Modeling Linear Inequalities

49 ANS:

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

PTS: 2

REF: 011526ai

NAT: S.ID.5

TOP: Frequency Tables

50 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.6

TOP: Correlation Coefficient and Residuals

51 ANS: 4

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

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

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

$$1500 > p$$

PTS: 2 REF: 061524ai NAT: A.CED.1 TOP: Modeling Linear Inequalities

52 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.4 TOP: Solving Quadratics

KEY: completing the square

53 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.1 TOP: Operations with Polynomials

KEY: multiplication

54 ANS: 4

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

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

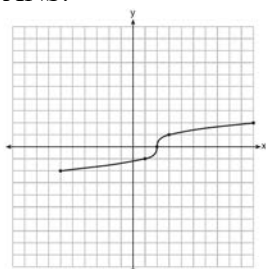
55 ANS: 3

$$5x^2 - (4x^2 - 12x + 9) = x^2 + 12x - 9$$

PTS: 2 REF: 011610ai NAT: A.APR.1 TOP: Operations with Polynomials

KEY: multiplication

56 ANS:



PTS: 2

REF: fall1304ai

NAT: F.IF.7

TOP: Graphing Root Functions

57 ANS:

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

PTS: 2

REF: 081432ai

NAT: A.REI.4

TOP: Solving Quadratics

KEY: completing the square

58 ANS: 4

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

$$y = -3$$

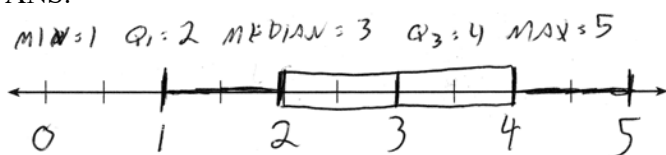
PTS: 2

REF: 011509ai

NAT: F.IF.4

TOP: Graphing Linear Functions

59 ANS:



PTS: 2

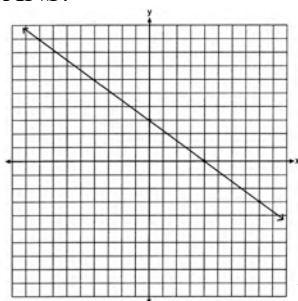
REF: 061432ai

NAT: S.ID.1

TOP: Box Plots

KEY: represent

60 ANS:



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

PTS: 2

REF: 061429ai

NAT: A.REI.10

TOP: Identifying Solutions

61 ANS: 4

PTS: 2

REF: 011621ai

NAT: A.REI.5

TOP: Solving Linear Systems

62 ANS:

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

$$0.005x = 90$$

$$x = 18000$$

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

KEY: substitution

63 ANS: 4

PTS: 2

REF: 011608ai

NAT: A.SSE.1

TOP: Modeling Exponential Functions

64 ANS: 3

PTS: 2

REF: 061501ai

NAT: F.LE.5

TOP: Modeling Linear Functions

65 ANS: 2

PTS: 2

REF: 011619ai

NAT: F.IF.2

TOP: Domain and Range

KEY: real domain, exponential

66 ANS: 2

$$P(x) = -0.5x^2 + 800x - 100 - (300x + 250) = -0.5x^2 + 500x - 350$$

PTS: 2

REF: 081406ai

NAT: A.APR.1

TOP: Operations with Polynomials

KEY: functional notation

67 ANS:

$$x^4 + 6x^2 - 7$$

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

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

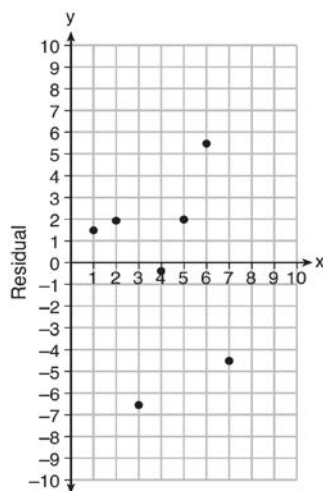
PTS: 2

REF: 061431ai

NAT: A.SSE.2

TOP: Factoring Polynomials

68 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.6

TOP: Correlation Coefficient and Residuals

69 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.1

TOP: Operations with Polynomials

KEY: multiplication

70 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.2

TOP: Functional Notation

71 ANS: 4

$$\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.$$

PTS: 2

REF: 081414ai

NAT: F.IF.6

TOP: Rate of Change

72 ANS: 3

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

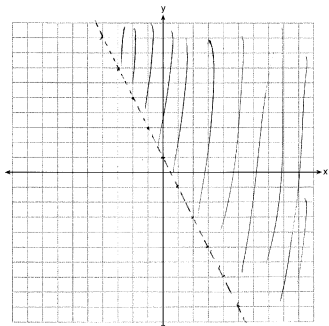
PTS: 2

REF: 061511ai

NAT: F.IF.6

TOP: Rate of Change

73 ANS:



PTS: 2

REF: 081526ai

NAT: A.REI.12

TOP: Graphing Linear Inequalities

74 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.

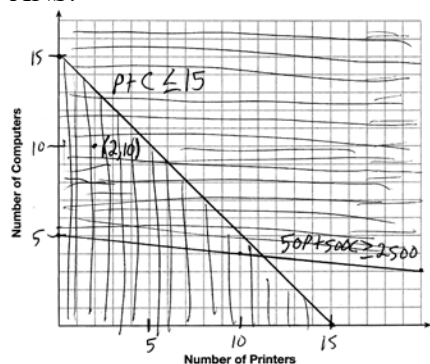
PTS: 2

REF: fall1303ai

NAT: S.ID.6

TOP: Correlation Coefficient and Residuals

75 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.3 TOP: Modeling Systems of Linear Inequalities

76 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.11 TOP: Quadratic-Linear Systems

77 ANS:

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

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

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

$$= -(x - 4)^2 + 25$$

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

78 ANS:

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h} \quad d = 2\sqrt{\frac{66}{3.3\pi}} \approx 5$$

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

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

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

79 ANS: 1

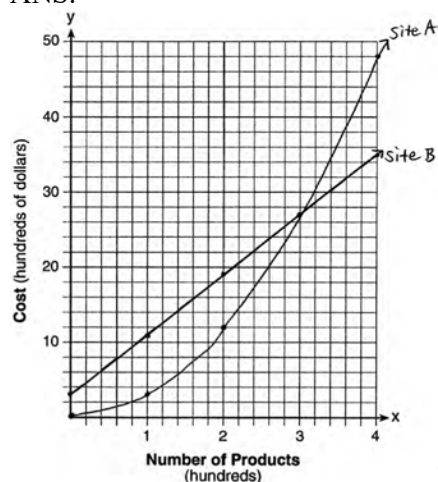
PTS: 2

REF: 061420ai

NAT: F.IF.2

TOP: Functional Notation

80 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.7 TOP: Quadratic-Linear Systems

KEY: graphically

81 ANS: 2

$$(x + 4)(x + 6) = 0$$

$$x^2 + 10x + 24 = 0$$

PTS: 2 REF: spr1303ai NAT: A.APR.3 TOP: Zeros of Polynomials

82 ANS: 2

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

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

83 ANS: 3

PTS: 2

REF: 011606ai

TOP: A.CED.4

TOP: Transforming Formulas

84 ANS: 3

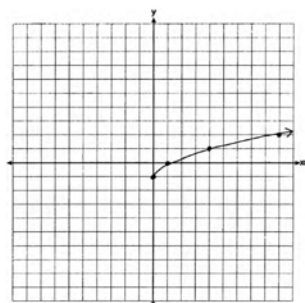
PTS: 2

REF: 061522ai

NAT: F.BF.2

TOP: Sequences

85 ANS:



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

86 ANS: 2

PTS: 2

REF: 061516ai

NAT: S.ID.9

TOP: Analysis of Data

87 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.4 TOP: Transforming Formulas

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

TOP: Graphing Linear Inequalities

89 ANS: 4 PTS: 2 REF: 061422ai NAT: A.CED.3

TOP: Modeling Linear Equations

90 ANS:

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

$$68 = l^2$$

$$8.2 \approx l$$

$$4.1 \approx w$$

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

91 ANS:

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

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

92 ANS: 4

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

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

$$x = 15, -2$$

PTS: 2 REF: 061510ai NAT: A.APR.3 TOP: Zeros of Polynomials

93 ANS: 3

$$15 > 5$$

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

94 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.4

TOP: Solving Quadratics

KEY: completing the square

95 ANS: 2

PTS: 2

REF: 061404ai

NAT: A.REI.12

TOP: Graphing Systems of Linear Inequalities

KEY: bimodalgraph | graph

96 ANS: 1

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

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

$$\frac{1}{3} < 3$$

PTS: 2

REF: 061515ai

NAT: F.LE.3

TOP: Families of Functions

97 ANS: 2

PTS: 2

REF: 081402ai

NAT: F.LE.5

TOP: Modeling Linear Functions

98 ANS: 4

PTS: 2

REF: 061502ai

NAT: F.IF.4

TOP: Relating Graphs to Events

99 ANS: 1

$$25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60$$

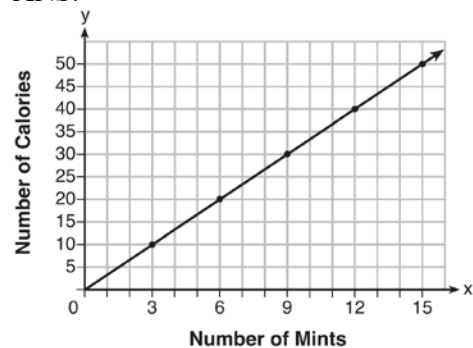
PTS: 2

REF: 011508ai

NAT: F.IF.2

TOP: Functional Notation

100 ANS:



$$C(x) = \frac{10}{3}x \quad 180 = \frac{10}{3}x$$

$$540 = 10x$$

$$54 = x$$

PTS: 4

REF: fall1308ai

NAT: A.CED.2

TOP: Graphing Linear Functions

101 ANS:

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

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

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

$$12 \leq 2x$$

$$6 \leq x$$

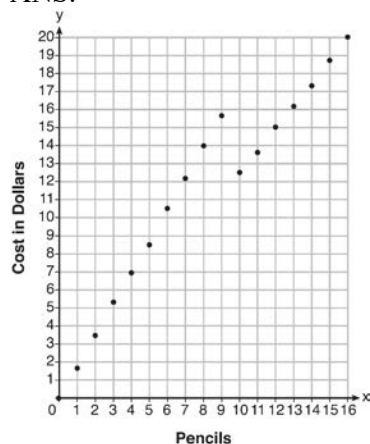
PTS: 4

REF: 081534ai

NAT: A.REI.3

TOP: Interpreting Solutions

102 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.7

TOP: Graphing Piecewise-Defined Functions

103 ANS: 1

PTS: 2

REF: 011623ai

NAT: F.LE.1

TOP: Families of Functions

104 ANS: 4

PTS: 2

REF: 081508ai

NAT: A.CED.3

TOP: Modeling Linear Equations

105 ANS: 2

PTS: 2

REF: 011510ai

NAT: A.APR.1

TOP: Operations with Polynomials

KEY: multiplication

106 ANS: 2

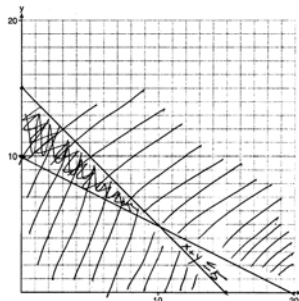
PTS: 2

REF: 061517ai

NAT: A.SSE.1

TOP: Modeling Exponential Functions

107 ANS:



$$x + y \leq 15$$

$$4x + 8y \geq 80$$

One hour at school and eleven hours at the library.

PTS: 6

REF: 081437ai

NAT: A.CED.3

TOP: Modeling Systems of Linear Inequalities

108 ANS:

Exponential, because the function does not grow at a constant rate.

PTS: 2 REF: 081527ai NAT: F.LE.1 TOP: Families of Functions

109 ANS: 1 PTS: 2 REF: 081401ai NAT: N.RN.3

TOP: Classifying Numbers

110 ANS: 2 PTS: 2 REF: 011601ai NAT: A.SSE.3

TOP: Vertex Form of a Quadratic

111 ANS: 2 PTS: 2 REF: 081501ai NAT: F.BF.3

TOP: Graphing Linear Functions

112 ANS: 1

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

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

113 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. $(x - 3)(2x) = 1.25x^2$ $1.25(8)^2 = 80$

$$2x^2 - 6x = 1.25x^2$$

$$.75x^2 - 6x = 0$$

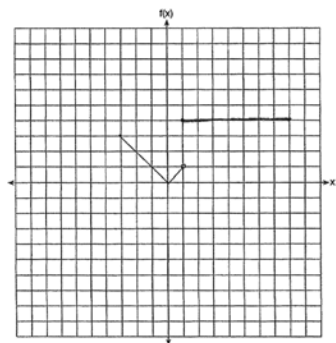
$$x^2 - 8x = 0$$

$$x(x - 8) = 0$$

$$x = 8$$

PTS: 6 REF: 011537ai NAT: A.CED.1 TOP: Geometric Applications of Quadratics

114 ANS:



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

115 ANS: 1

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

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

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

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

116 ANS: 3

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

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

$$0.75p = 48.75$$

$$p = 65$$

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

117 ANS: 3

PTS: 2

REF: 081410ai

NAT: F.LE.2

TOP: Families of Functions

KEY: bimodalgraph

118 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.4 TOP: Solving Quadratics

KEY: completing the square

119 ANS: 1

PTS: 2

REF: 081417ai

NAT: F.BF.3

TOP: Graphing Quadratic Functions

120 ANS:

Correct. The sum of a rational and irrational is irrational.

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

121 ANS: 3

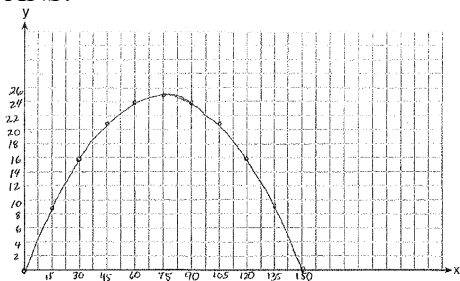
PTS: 2

REF: 081509ai

NAT: A.SSE.2

TOP: Factoring Polynomials

122 ANS:



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

(75,25) represents the horizontal distance (75) where the football is at its greatest height (25). No, because the ball is less than 10 feet high $y = -\frac{1}{225}(135)^2 + \frac{2}{3}(135) = -81 + 90 = 9$

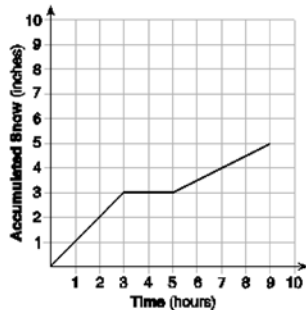
PTS: 6

REF: 061537ai

NAT: F.IF.4

TOP: Graphing Quadratic Functions

123 ANS:



At 6 hours, $3\frac{1}{2}$ inches of snow have fallen.

PTS: 4

REF: spr1307ai

NAT: F.IF.4

TOP: Relating Graphs to Events

124 ANS: 4

PTS: 2

REF: 011503ai

NAT: A.SSE.3

TOP: Solving Quadratics

KEY: factoring

125 ANS:

$$-2x^2 + 6x + 4$$

PTS: 2

REF: 011528ai

NAT: A.APR.1

TOP: Operations with Polynomials

KEY: subtraction

126 ANS:

$r \approx 0.94$. The correlation coefficient suggests that as calories increase, so does sodium.

PTS: 4

REF: 011535ai

NAT: S.ID.8

TOP: Correlation Coefficient

127 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.3

TOP: Classifying Numbers

128 ANS:
 $y = 0.16x + 8.27$ $r = 0.97$, which suggests a strong association.

PTS: 4 REF: 081536ai NAT: S.ID.6 TOP: Regression
 KEY: linear

129 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.4 TOP: Solving Quadratics
 KEY: taking square roots

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

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

132 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.4 TOP: Solving Quadratics
 KEY: quadratic formula

133 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.3 TOP: Classifying Numbers

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

135 ANS: 1 PTS: 2 REF: 061505ai NAT: A.REI.12
 TOP: Graphing Linear Inequalities

136 ANS:

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

$$6p + 9d \geq 5000 \quad 2640 + 9d \geq 5000$$

$$9d \geq 2360$$

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

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

137 ANS:

Yes, because every element of the domain is assigned one unique element in the range.

PTS: 2 REF: 061430ai NAT: F.IF.1 TOP: Defining Functions

KEY: ordered pairs

138 ANS: 2 PTS: 2 REF: 061508ai NAT: N.RN.3

TOP: Classifying Numbers

139 ANS:

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

$$45x = 15$$

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

PTS: 2 REF: spr1305ai NAT: A.CED.3 TOP: Modeling Linear Equations

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

TOP: Operations with Polynomials KEY: subtraction

141 ANS: 2

$$0 = -16t^2 + 144$$

$$16t^2 = 144$$

$$t^2 = 9$$

$$t = 3$$

PTS: 2 REF: 081423ai NAT: F.IF.5 TOP: Domain and Range

142 ANS: 3

x	$A = 5000x + 10000$	$B = 500(2)^{x-1}$
6	40,000	16,000
7	45,000	32,000
8	50,000	64,000
9	55,000	128,000

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

143 ANS:

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

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

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

$$-3.15c = -31.50$$

$$c = 10$$

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

144 ANS: 2

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

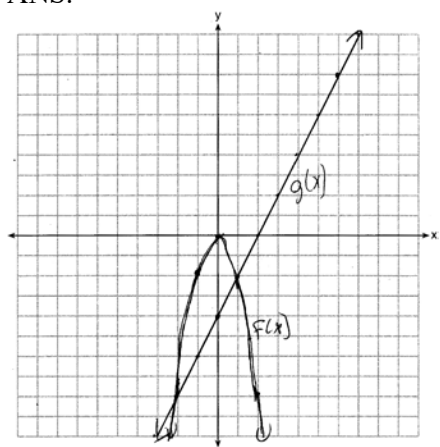
$$x^2 - 6x + 9 = 12 + 9$$

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

PTS: 2 REF: 061408ai NAT: A.REI.4 TOP: Solving Quadratics

KEY: completing the square

145 ANS:



$$x = -2, 1$$

PTS: 4 REF: 081435ai NAT: A.REI.7 TOP: Quadratic-Linear Systems

KEY: graphically

146 ANS: 3 PTS: 2 REF: 061415ai NAT: F.LE.2

TOP: Families of Functions

147 ANS:

$$b^2 - 4ac = (-2)^2 - 4(1)(5) = 4 - 20 = -16 \quad \text{None}$$

PTS: 2 REF: 081529ai NAT: A.REI.4 TOP: Using the Discriminant

148 ANS: 3 PTS: 2 REF: 081507ai NAT: F.LE.2

TOP: Modeling Exponential Functions

149 ANS: 3 PTS: 2 REF: 011518ai NAT: A.REI.11

TOP: Other Systems

150 ANS: 4 PTS: 2 REF: 081505ai NAT: A.CED.1

TOP: Modeling Linear Inequalities

151 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.12 TOP: Graphing Systems of Linear Inequalities
KEY: solution set

152 ANS:

No, because the relation does not pass the vertical line test.

PTS: 2 REF: 011626ai NAT: F.IF.1 TOP: Defining Functions
KEY: graphs

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

154 ANS: 3 PTS: 2 REF: spr1302ai NAT: A.APR.3
TOP: Zeros of Polynomials

155 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.4 TOP: Solving Quadratics
KEY: factoring

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

157 ANS:

$$y = 0.05x - 0.92$$

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

158 ANS: 1

$$\frac{x-2}{3} = \frac{4}{6}$$

$$6x - 12 = 12$$

$$6x = 24$$

$$x = 4$$

PTS: 2 REF: 081420ai NAT: A.REI.3 TOP: Solving Linear Equations
KEY: fractional expressions

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

- 160 ANS: 4 PTS: 2 REF: 081419ai NAT: A.CED.3
TOP: Modeling Linear Systems
- 161 ANS:
 $m(x) = (3x - 1)(3 - x) + 4x^2 + 19 \quad x^2 + 10x + 16 = 0$
 $m(x) = 9x - 3x^2 - 3 + x + 4x^2 + 19 \quad (x + 8)(x + 2) = 0$
 $m(x) = x^2 + 10x + 16 \quad x = -8, -2$
- PTS: 4 REF: 061433ai NAT: A.REI.4 TOP: Solving Quadratics
KEY: factoring
- 162 ANS: 4 PTS: 2 REF: 081503ai NAT: A.SSE.1
TOP: Modeling Expressions
- 163 ANS: 2
 $x^2 - 8x = 7$
 $x^2 - 8x + 16 = 7 + 16$
 $(x - 4)^2 = 23$
- PTS: 2 REF: 011614ai NAT: A.REI.4 TOP: Solving Quadratics
KEY: completing the square
- 164 ANS: 1 PTS: 2 REF: 011604ai NAT: N.RN.3
TOP: Classifying Numbers
- 165 ANS:
 $\frac{m}{351} = \frac{70}{70 + 35}$
 $105m = 24570$
 $m = 234$
- PTS: 2 REF: 011630ai NAT: S.ID.5 TOP: Frequency Tables
- 166 ANS: 1 PTS: 2 REF: 061521ai NAT: A.REI.4
TOP: Solving Quadratics KEY: taking square roots
- 167 ANS:
 $8m^2 + 20m - 12 = 0$
 $4(2m^2 + 5m - 3) = 0$
 $(2m - 1)(m + 3) = 0$
 $m = \frac{1}{2}, -3$
- PTS: 2 REF: fall1305ai NAT: A.SSE.3 TOP: Solving Quadratics
KEY: factoring
- 168 ANS: 2 PTS: 2 REF: 011611ai NAT: A.CED.1
TOP: Geometric Applications of Quadratics
- 169 ANS: 1 PTS: 2 REF: 081504ai NAT: A.APR.3
TOP: Zeros of Polynomials

- 170 ANS: 1 PTS: 2 REF: 061401ai NAT: A.REI.1
TOP: Identifying Properties
- 171 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.5 TOP: Modeling Linear Functions
- 172 ANS: 2 PTS: 2 REF: 011502ai NAT: N.Q.1
TOP: Conversions KEY: dimensional analysis
- 173 ANS: 3 PTS: 2 REF: 061407ai NAT: F.LE.5
TOP: Modeling Linear Functions
- 174 ANS:
 $(2x + 8)(2x + 6) = 100$ The frame has two parts added to each side, so $2x$ must be added to the length and width.
 $4x^2 + 28x + 48 = 100$
 $x^2 + 7x - 13 = 0$
- Multiply length and width to find area and set equal to 100. $x = \frac{-7 \pm \sqrt{7^2 - 4(1)(-13)}}{2(1)} = \frac{-7 + \sqrt{101}}{2} \approx 1.5$
- PTS: 6 REF: 081537ai NAT: A.CED.1 TOP: Geometric Applications of Quadratics
- 175 ANS: 4 PTS: 2 REF: 061421ai NAT: F.BF.2
TOP: Sequences
- 176 ANS:
Linear, because the function has a constant rate of change.
- PTS: 2 REF: 011625ai NAT: F.LE.1 TOP: Families of Functions
- 177 ANS: 3 PTS: 2 REF: 081403ai NAT: A.REI.4
TOP: Solving Quadratics KEY: taking square roots
- 178 ANS:
 $B = 3000(1.042)^t$
- PTS: 2 REF: 081426ai NAT: F.BF.1 TOP: Modeling Exponential Functions
- 179 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.6 TOP: Regression
KEY: exponential
- 180 ANS: 4 PTS: 2 REF: 011514ai NAT: S.ID.2
TOP: Central Tendency and Dispersion
- 181 ANS: 3 PTS: 2 REF: 081506ai NAT: A.REI.12
TOP: Graphing Systems of Linear Inequalities KEY: graph
- 182 ANS: 2 PTS: 2 REF: 061503ai NAT: A.SSE.2
TOP: Factoring the Difference of Perfect Squares

183 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.1 TOP: Operations with Polynomials
KEY: multiplication

184 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.1 TOP: Defining Functions
KEY: ordered pairs

185 ANS: 2 PTS: 2 REF: 011506ai NAT: F.IF.5
TOP: Domain and Range

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

187 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.6 TOP: Rate of Change

188 ANS: 3 PTS: 2 REF: 011618ai NAT: F.LE.2
TOP: Sequences

189 ANS: 1 PTS: 2 REF: 061507ai NAT: F.IF.7
TOP: Graphing Step Functions KEY: bimodalgraph

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

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

192 ANS:

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

$$5x = 12$$

$$x = 2.4$$

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

193 ANS: 1

$$f(2) = 0$$

$$f(6) = 8$$

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

194 ANS: 3

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

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

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

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

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

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

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

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

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

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

PTS: 2

REF: 061514ai

NAT: F.IF.9

TOP: Comparing Functions

195 ANS:

$$A = 600(1.016)^2 \approx 619.35$$

PTS: 2

REF: 061529ai

NAT: A.CED.1

TOP: Modeling Exponential Functions

196 ANS:

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

PTS: 4

REF: fall1313ai

NAT: S.ID.6

TOP: Regression

KEY: choose model

197 ANS:

$$8x + 11y \geq 200 \quad 8x + 11(15) \geq 200$$

$$8x + 165 \geq 200$$

$$8x \geq 35$$

$$x \geq 4.375$$

5 hours

PTS: 4

REF: fall1309ai

NAT: A.CED.3

TOP: Modeling Linear Inequalities

198 ANS:

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

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

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

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

$$t = 5$$

PTS: 4

REF: 011633ai

NAT: F.IF.4

TOP: Graphing Quadratic Functions

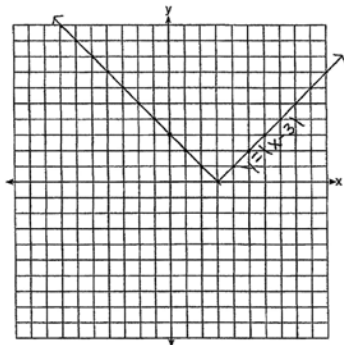
199 ANS: 1 PTS: 2 REF: 081415ai NAT: A.SSE.2
TOP: Factoring Polynomials

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

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

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

202 ANS:



The graph has shifted three units to the right.

PTS: 2 REF: 061525ai NAT: F.BF.3 TOP: Graphing Absolute Value Functions
203 ANS: 2 PTS: 2 REF: 011512ai NAT: F.BF.3
TOP: Graphing Quadratic Functions

204 ANS: 3 PTS: 2 REF: 011515ai NAT: F.IF.8
TOP: Modeling Exponential Functions

205 ANS: 1 PTS: 2 REF: 081515ai NAT: F.IF.6
TOP: Rate of Change

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

207 ANS:
0.5 represents the rate of decay and 300 represents the initial amount of the compound.

PTS: 2 REF: 061426ai NAT: F.LE.5 TOP: Modeling Exponential Functions
208 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.1 TOP: Modeling Linear Functions

209 ANS: 2

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

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

$$17L = 136$$

$$L = 8$$

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

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

TOP: Graphing Quadratic Functions

211 ANS:

Two of the following: quadratic formula, complete the square, factor by grouping or graphically.

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8} \approx -0.7, -3.3$$

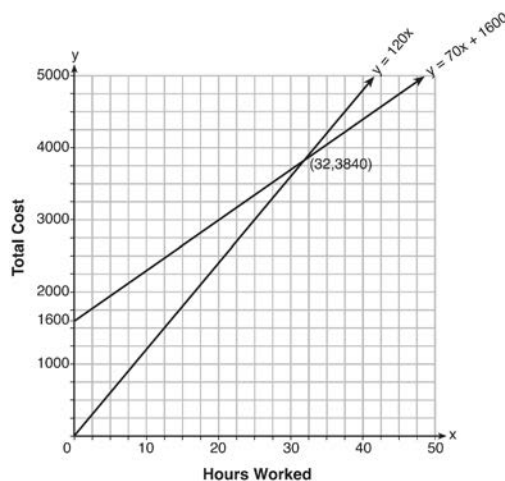
PTS: 4 REF: 011634ai NAT: A.REI.4 TOP: Solving Quadratics

KEY: quadratic formula

212 ANS: 3 PTS: 2 REF: 011612ai NAT: A.SSE.2

TOP: Factoring Polynomials

213 ANS:



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

$$120x = 70x + 1600$$

$$50x = 1600$$

$$x = 32$$

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

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

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

214 ANS: 3

$$119.67(0.61)^5 - 119.67(0.61)^3 \approx 17.06$$

PTS: 2 REF: 011603ai NAT: F.IF.2 TOP: Evaluating Functions

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

216 ANS: 4
 $x^2 + 6x = 7$
 $x^2 + 6x + 9 = 7 + 9$
 $(x + 3)^2 = 16$

PTS: 2 REF: 011517ai NAT: A.REI.4 TOP: Solving Quadratics
KEY: completing the square

217 ANS: 4
 $16^{2t} = n^{4t}$
 $16^2 = n^4$
 $256 = n^4$
 $4 = n$

PTS: 2 REF: 011519ai NAT: A.SSE.3 TOP: Exponential Equations
218 ANS: 4 PTS: 2 REF: 011523ai NAT: F.BF.1
TOP: Modeling Linear Functions

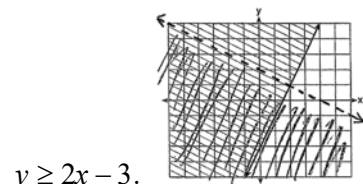
219 ANS:
 $2p + 3d = 18.25$ $4p + 6d = 36.50$ $4p + 2(2.25) = 27.50$
 $4p + 2d = 27.50$ $4p + 2d = 27.50$ $4p = 23$
 $4d = 9$ $p = 5.75$
 $d = 2.25$

PTS: 2 REF: 011533ai NAT: A.CED.3 TOP: Modeling Linear Systems
220 ANS: 3 PTS: 2 REF: 061411ai NAT: S.ID.8
TOP: Correlation Coefficient

221 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.2 TOP: Central Tendency and Dispersion
222 ANS:



Oscar is wrong. $(2) + 2(1) < 4$ is not true.

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

223 ANS: 1 PTS: 2 REF: 011615ai NAT: F.IF.5
TOP: Domain and Range

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

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

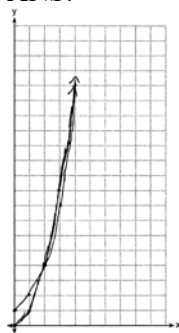
226 ANS: 1
 $7 - \frac{2}{3}x < x - 8$

$$15 < \frac{5}{3}x$$

$$9 < x$$

PTS: 2 REF: 011507ai NAT: A.REI.3 TOP: Solving Linear Inequalities

227 ANS:



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

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

228 ANS:
 $f(x) = 6.50x + 4(12)$

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

229 ANS: 3 PTS: 2 REF: 011622ai NAT: F.IF.9
TOP: Comparing Functions

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

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

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

232 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.3 TOP: Solving Quadratics

KEY: zeros of polynomials

233 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.3 TOP: Sequences

234 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.11 TOP: Quadratic-Linear Systems

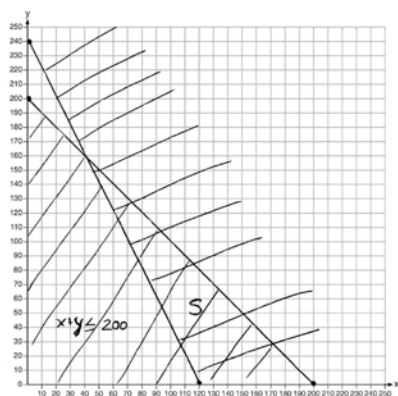
235 ANS:

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

$$12.5x + 6.25y \geq 1500$$

$$375 + 500 < 1500$$

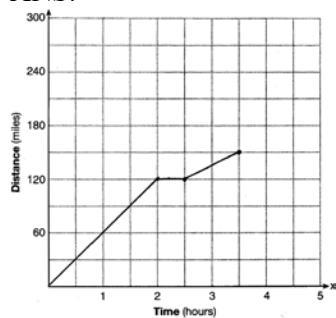
$$875 < 1500$$



PTS: 6 REF: 011637ia NAT: A.REI.12 TOP: Graphing Systems of Linear Inequalities

KEY: graph

236 ANS:



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

237 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.6 TOP: Regression

KEY: linear

238 ANS: 3 PTS: 2 REF: 081523ai NAT: A.REI.4

TOP: Solving Quadratics KEY: taking square roots

239 ANS: 2 PTS: 2 REF: 061424ai NAT: F.LE.2

TOP: Sequences

240 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.10 TOP: Identifying Solutions

241 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.2 TOP: Central Tendency and Dispersion

242 ANS: 1 PTS: 2 REF: 081514ai NAT: F.LE.2

TOP: Sequences

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

TOP: Graphing Systems of Linear Inequalities KEY: solution set

244 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.3

TOP: Solving Quadratics

KEY: zeros of polynomials

245 ANS: 4

PTS: 2

REF: 061509ai

NAT: F.IF.2

TOP: Domain and Range

KEY: graph