Name _____ Date _____

Mr. Schlansky Algebra I

Next Generation Algebra Common Regents Test

1. 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) $3x^2 - 14x + 14$

2. What is the solution of $\frac{k+4}{2} = \frac{k+9}{3}$?

1) 1
2) 5
3) 6
4) 14

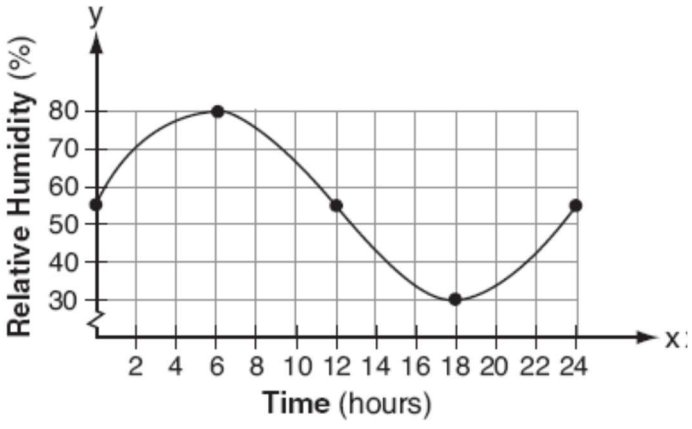
3. The number of bacteria grown in a lab can be modeled by $P(t) = 300 \bullet 2^{4t}$, where t is the number of hours. Which expression is equivalent to $P(t)$?

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

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

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

5. $f(x)$ is graphed below. Evaluate $f(18)$.



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

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

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

8. 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.

9. When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

10. Multiply $(2x^2 + 3x - 2)(x - 2)$

11. What is the result when $6x^2 - 13x + 12$ is subtracted from $-3x^2 + 6x + 7$?

1) $3x^2 - 7x + 19$
2) $9x^2 - 19x + 5$
3) $9x^2 - 7x + 19$
4) $-9x^2 + 19x - 5$

12. Solve the equation below algebraically for the exact value of x.

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

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

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

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

16. 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.

17. 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.

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

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

19. Solve the following system of equations for x and y:
$-3x + 4y = 12$
$2x + y = -8$

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

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

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

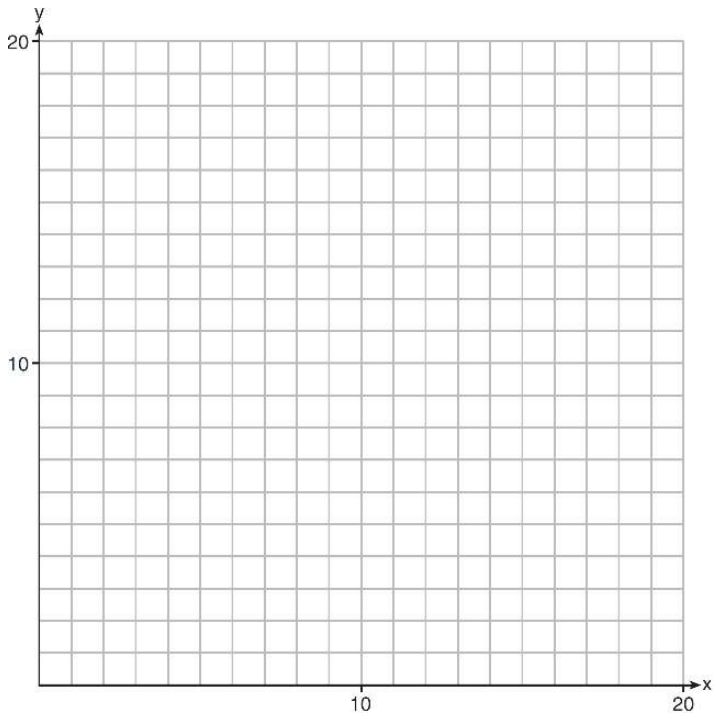
3) $D + Q = 30$
$.25D + .10Q = 4.80$

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

21. During its first week of business, a market sold a total of 108 apples and oranges. The second week, five times the number of apples and three times the number of oranges were sold. A total of 452 apples and oranges were sold during the second week. Determine how many apples and how many oranges were sold the first week.

22. Write the equation of the line passing through (2,-2) and (-3, 8) in both point slope and slope intercept form

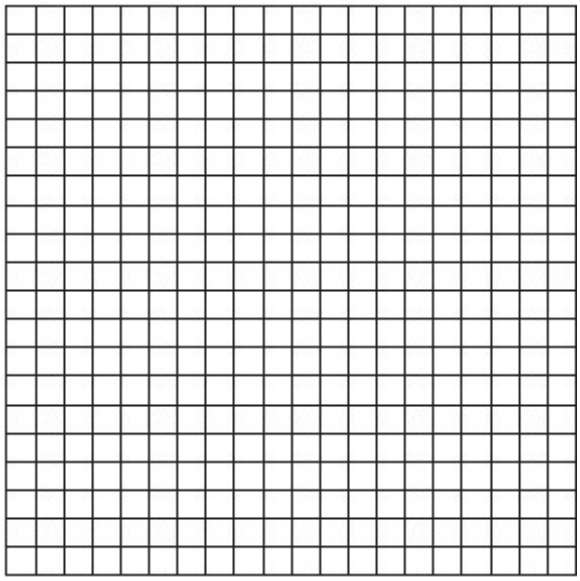
23. Edith babysits for x hours a week after school at a job that pays \$4 an hour. She has accepted a job that pays \$8 an hour as a library assistant working y hours a week. She will work both jobs. She is able to work no more than 15 hours a week, due to school commitments. Edith wants to earn at least \$80 a week, working a combination of both jobs. Write a system of inequalities that can be used to represent the situation. Graph these inequalities on the set of axes below. Determine and state one combination of hours that will allow Edith to earn *at least* \$80 per week while working *no more than* 15 hours.



24. Solve the following system of inequalities graphically on the grid below and label the solution S.
Is the point $(3, 7)$ in the solution set? Explain your answer.

$3x + 4y > 20$

$x < 3y - 18$



25. Sheba opened a retirement account with $36,500. Her account grew at a rate of 7% per year compounded annually. She made no deposits or withdrawals on the account. At the end of 20 years, what was the account worth, to the *nearest dollar*?

26. 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. Explain what the 5100 and 0.95 represent in the context of the problem.

27. Which situation is *not* a linear function?

1) A gym charges a membership fee of $10.00 down and $10.00 per month.
2) A cab company charges $2.50 initially and $3.00 per mile.
3) A restaurant employee earns $12.50 per hour.
4) A $12,000 car depreciates 15% per year.

28. The function, $t(x)$, is shown in the table below. Determine whether $t(x)$ is linear or exponential. Explain your answer.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Factor the following expressions completely

29. $4t^2 - 25$

30. $m^2 - 8m + 15$

31. $2x^2 - 50$

32. $2x^2 - 8x - 10$

33. Solve for x:
$x^2 + 3x = 8x - 4$

Solve the following system for all values of x and y:

34.
$$y - 5 = x^2 - 2x$$
$$y + 7 = 5x$$

35. Express $6\sqrt{2} \bullet 2\sqrt{14}$ in simplest radical form

36. Express $2y\sqrt{12} + 3y\sqrt{27}$ in simplest radical form

37. Express $\frac{6}{5\sqrt{2}}$ in simplest radical form

38. Solve algebraically for x rounding all values to the *nearest tenth*.
$3x^2 + 2x - 4 = 0$

39. Which equation has the same solutions as $x^2 - 8x + 3 = 0$?

(1) $(x-8)^2 = 16$ (3) $(x-4)^2 = 13$

(2) $(x-8)^2 = 13$ (4) $(x-4)^2 = 61$

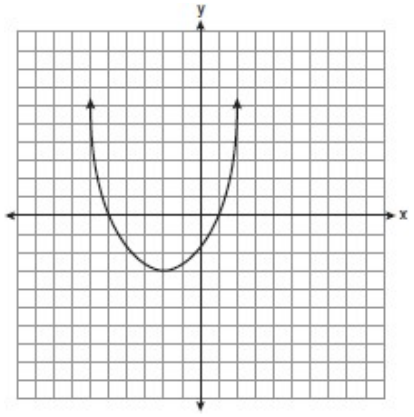
40. Solve the equation $x^2 - 6x = 15$ by completing the square.

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

42. 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

43. What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



1) The vertex is $(-2,-3)$, and the axis of symmetry is $x = -2$.
2) The vertex is $(-2,-3)$, and the axis of symmetry is $y = -2$.
3) The vertex is $(-3,-2)$, and the axis of symmetry is $y = -2$.
4) The vertex is $(-3,-2)$, and the axis of symmetry is $x = -2$.

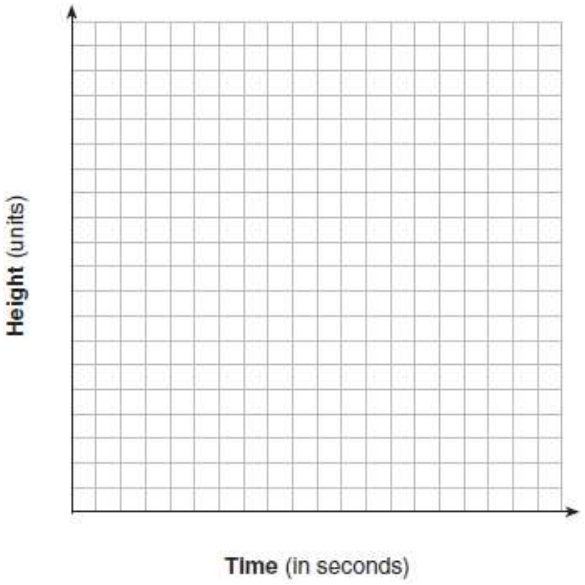
44. Rewrite the following equation in vertex form and state the vertex

$f(x) = 2x^2 + 12x - 6$

45. The expression $-4.9t^2 + 50t + 2$ represents the height, in meters, of a toy rocket t seconds after launch. The initial height of the rocket, in meters, is

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

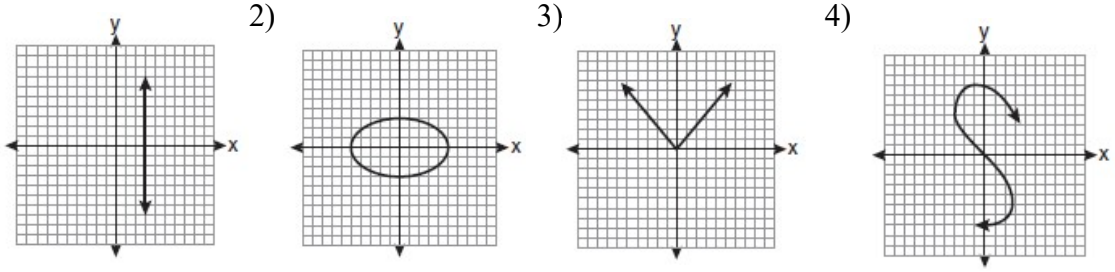
46. Alex launched a ball into the air. The height of the ball can be represented by the equation $h = -8t^2 + 40t + 5$, where h is the height, in units, and t is the time, in seconds, after the ball was launched. Graph the equation from $t = 0$ to $t = 5$ seconds.
State the coordinates of the vertex and explain its meaning in the context of the problem. State the interval of time where the height of the ball is increasing.



47. The height, H, in feet, of an object dropped from the top of a building after t seconds is given by $H(t) = -16t^2 + 144$. Determine, algebraically, how many seconds it will take for the object to reach the ground. What would be an appropriate domain in the context of the problem?

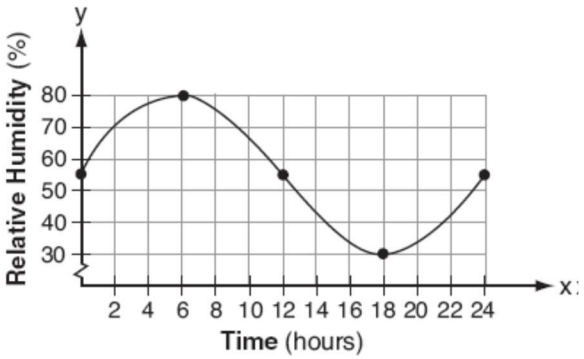
48. Which set of ordered pairs does *not* represent a function?
1) {(3,-2), (-2,3), (4,-1), (-1,4)}
2) {(3,-2), (3,-4), (4,-1), (4,-3)}
3) {(3,-2), (4,-3), (5,-4), (6,-5)}
4) {(3,-2), (5,-2), (4,-2), (-1,-2)}

49. Which graph represents a function?
1) 2) 3) 4)



50. A meteorologist drew the accompanying graph to show the changes in relative humidity during a 24-hour period in New York City.

State the domain and range



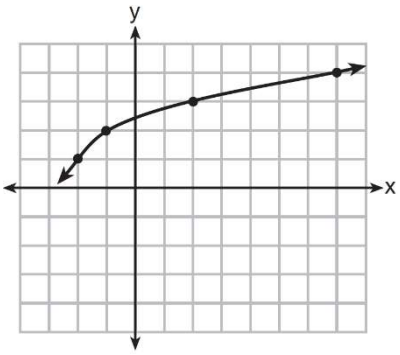
51. If the function $f(x) = x^2$ has the domain $\{0, 1, 4, 9\}$, what is its range?

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

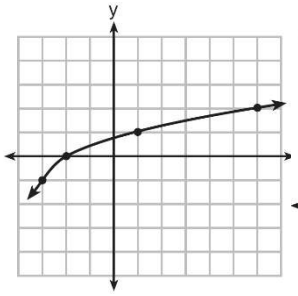
52. The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where x is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?

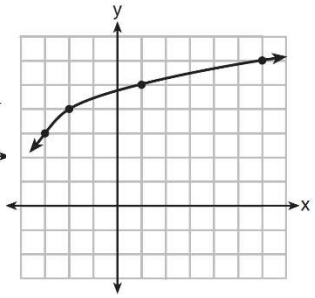
1) integers
2) positive real numbers
3) positive rational numbers
4) whole numbers

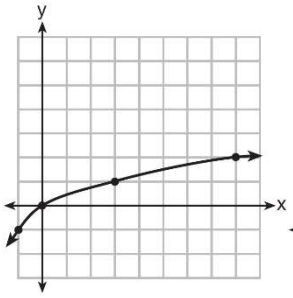
53. The graph of $y = f(x)$ is shown below.

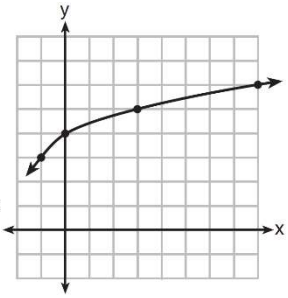


What is the graph of $y = f(x + 1) - 2$?

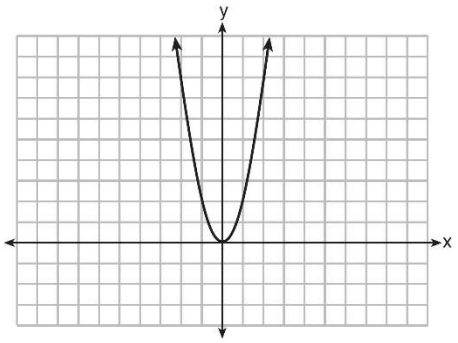
1)


2)


3)


4)


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



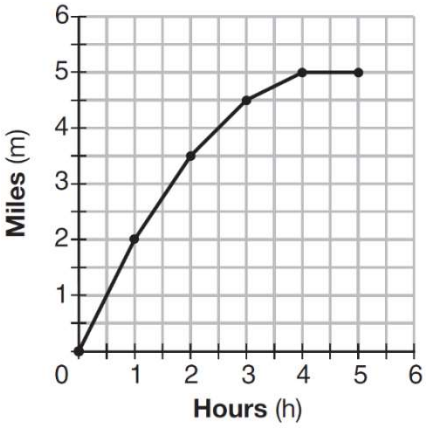
If a is multiplied by $-\frac{1}{2}$, the graph of the new equation is

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

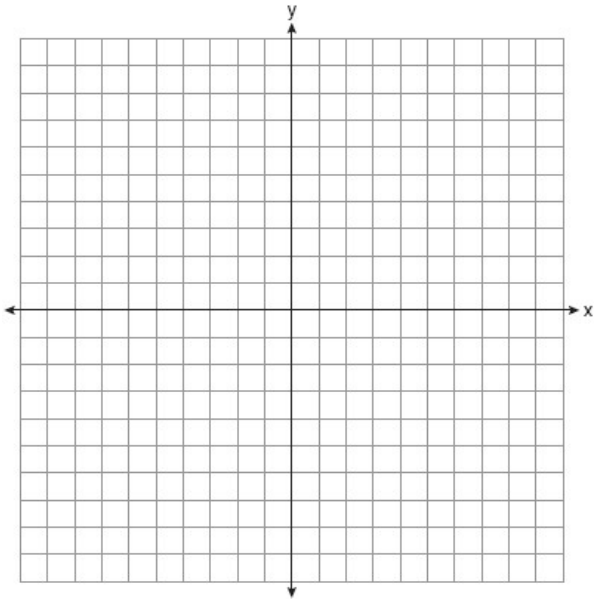
55. An astronaut drops a rock off the edge of a cliff on the Moon. The distance, $d(t)$, in meters, the rock travels after t seconds can be modeled by the function $d(t) = 0.8t^2$. What is the average rate of change, in meters per second, of the rock between 5 and 10 seconds after it was dropped? Explain its meaning in the context of the problem.

56. The graph below shows the distance in miles, m, hiked from a camp in h hours. Which hourly interval had the greatest rate of change? Which hourly interval had the least average rate of change?

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

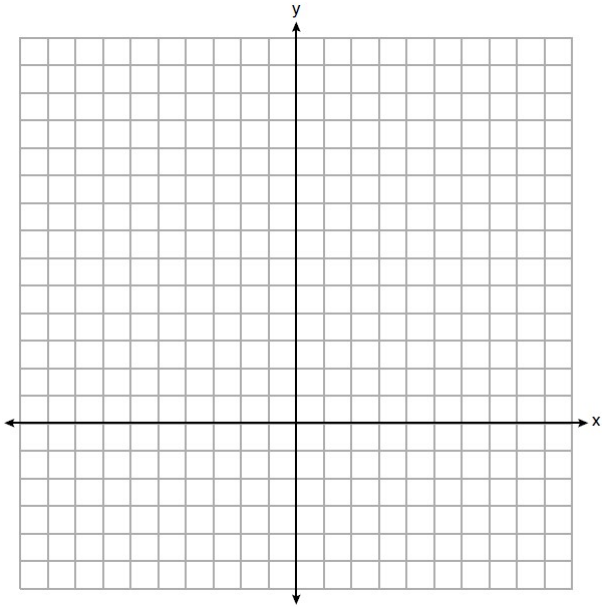


57. Graph $f(x) = \sqrt{x+2}$ over the domain $-2 \le x \le 7$.

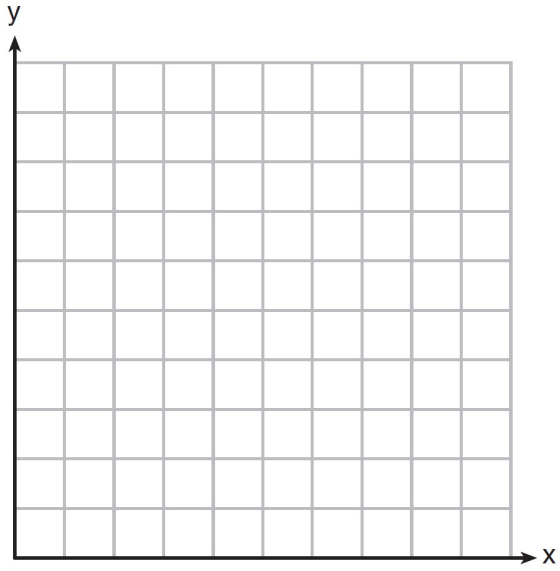


58. Graph $y = f(x)$ and $y = g(x)$ on the set of axes below. Determine and state all values of x for which $f(x) = g(x)$.

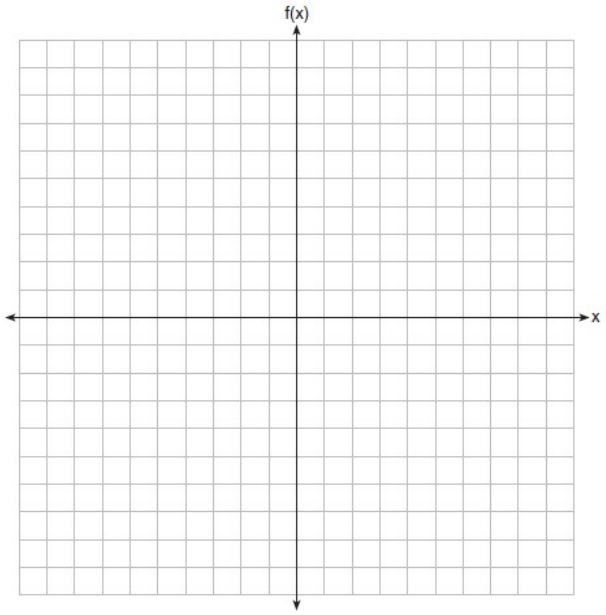
$f(x) = 2x^2 - 8x + 3$
$g(x) = -2x + 3$



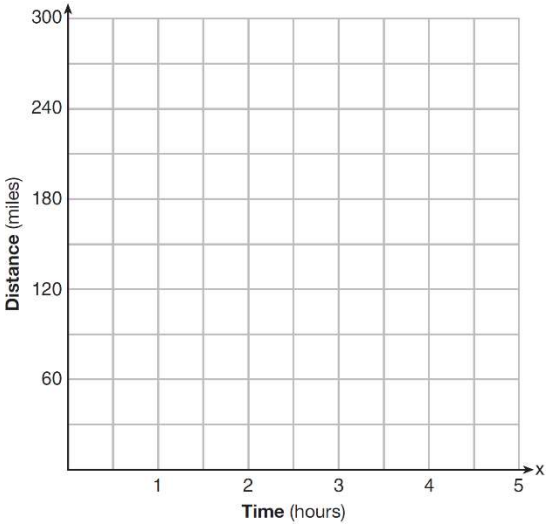
59. Franco and Caryl went to a bakery to buy desserts. Franco bought 3 packages of cupcakes and 2 packages of brownies for $19. Caryl bought 2 packages of cupcakes and 4 packages of brownies for $24. Let x equal the price of one package of cupcakes and y equal the price of one package of brownies. Write a system of equations that describes the given situation. On the set of axes below, graph the system of equations.
Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution



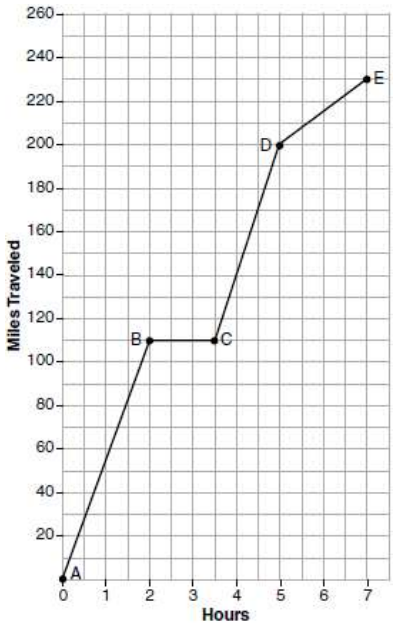
60. On the set of axes below, graph the piecewise function: $f(x) = \begin{cases} -\frac{1}{2}x, & x < 2 \\ x, & x \geq 2 \end{cases}$



61. 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.



62. The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving. Based on the graph, during which interval did Craig most likely drive in the city? Explain your reasoning. Explain what might have happened in the interval between *B* and *C*.

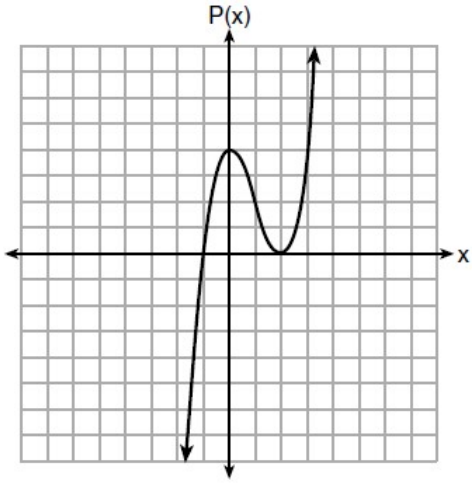


63. The table below represents the function F. The equation that represents this function is

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

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

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



Which equation could represent $P(x)$?

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

65. Which ordered pair below is *not* a solution to $f(x) = x^2 - 3x + 4$?

1) $(0, 4)$
2) $(1.5, 1.75)$
3) $(5, 14)$
4) $(-1, 6)$

66. Which quadratic function has the largest maximum?

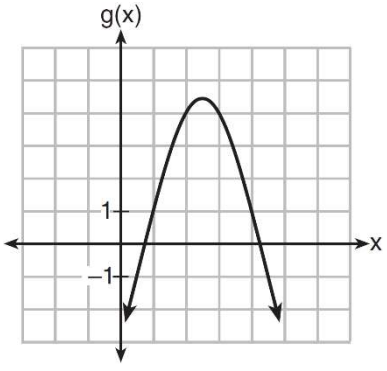
1) $h(x) = (3-x)(2+x)$

2)

x	f(x)
−1	−3
0	5
1	9
2	9
3	5
4	−3

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

4)



67. Write an equation for the following sequence and find the eighth term.
2, 6, 18, 54, ...

68. Write an equation for the following sequence and find the 20th term.
63, 57, 51, 45, ...

69. The second term in an arithmetic sequence is 8 and the fifth term is 17. Write the equation of this sequence.

70. The data given in the table below show some of the results of a study comparing the height of a certain breed of dog, based upon its mass. Write the linear regression equation for these data, where x is the mass and y is the height. Round all values to the *nearest tenth*. State the value of the correlation coefficient to the *nearest tenth*, and explain what it indicates.

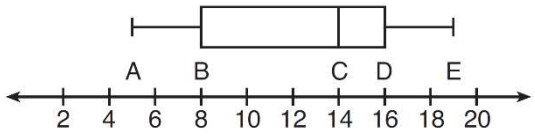
Mass (kg)	4.5	5	4	3.5	5.5	5	5	4	4	6	3.5	5.5
Height (cm)	41	40	35	38	43	44	37	39	42	44	31	30

71. A survey was given to 12th-grade students of West High School to determine the location for the senior class trip. The results are shown in the table below. To the *nearest percent*, what percent of the girls chose New York City?

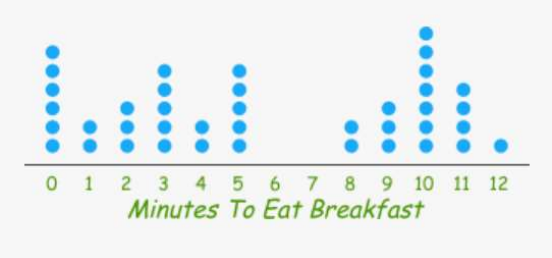
	Niagara Falls	**Darien Lake**	**New York City**
Boys	56	74	103
Girls	71	92	88

72. The box-and-whisker plot shown below represents the number of magazine subscriptions sold by members of a club.
Which statistical measures do points *B*, *D*, and *E* represent, respectively?

1) minimum, median, maximum
2) first quartile, median, third quartile
3) first quartile, third quartile, maximum
4) median, third quartile, maximum



73. The table below represents the time taken, in minutes, to eat breakfast. For this set of data, find the mean, median, mode, population standard deviation, range, and interquartile range. How many people were involved in this study?



74. Which situation describes a correlation that is *not* a causal relationship?

1) the length of the edge of a cube and the volume of the cube
2) the distance traveled and the time spent driving
3) the age of a child and the number of siblings the child has
4) the number of classes taught in a school and the number of teachers employed

75. Sarah travels on her bicycle at a speed of 22.7 miles per hour. What is Sarah's approximate speed, in kilometers per minute?

1) 0.2
2) 0.6
3) 36.5
4) 36.6

76. A construction worker needs to move 120 ft^3 of dirt by using a wheelbarrow. One wheelbarrow load holds 8 ft^3 of dirt and each load takes him 10 minutes to complete. One correct way to figure out the number of hours he would need to complete this job is

1) $\frac{120\ ft^3}{1} \bullet \frac{10\ min}{1\ load} \bullet \frac{60\ min}{1\ hr} \bullet \frac{1\ load}{8\ ft^3}$
2) $\frac{120\ ft^3}{1} \bullet \frac{60\ min}{1\ hr} \bullet \frac{8\ ft^3}{10\ min} \bullet \frac{1}{1\ load}$
3) $\frac{120\ ft^3}{1} \bullet \frac{1\ load}{10\ min} \bullet \frac{8\ ft^3}{1\ load} \bullet \frac{1\ hr}{60\ min}$
4) $\frac{120\ ft^3}{1} \bullet \frac{1\ load}{8\ ft^3} \bullet \frac{10\ min}{1\ load} \bullet \frac{1\ hr}{60\ min}$