Next Generation Algebra Regents Review Homework

1. 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) $x(x-2)(x+15)$

2. Which value of x is a solution of $\dfrac{5}{x} = \dfrac{x+13}{6}$?

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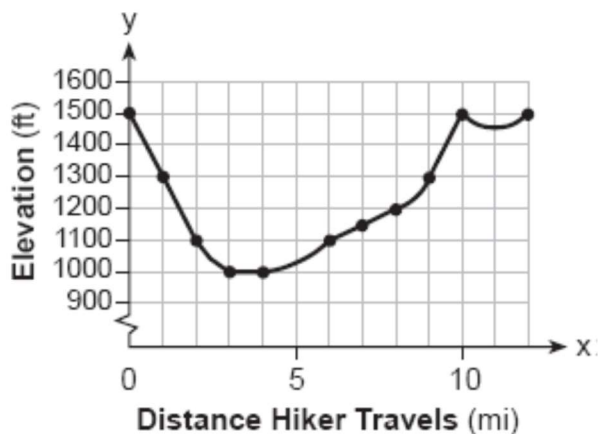2) -3 4) -15

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

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

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

4. If $k(x) = 2x^2 - 3\sqrt{x}$, then $k(9)$ is
1) 315   3) 159
2) 307   4) 153

5. $f(x)$ is graphed below. Evaluate f(3)

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

Problem: $3x^2 - 8 - 10x = 3(2x + 3)$

Step 1: $3x^2 - 10x - 8 = 6x + 9$

Which two properties did Britney use to get to step 1?
  I. addition property of equality
  II. commutative property of addition
  III. multiplication property of equality
  IV. distributive property of multiplication over addition

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

7. Jakob is working on his math homework. He decides that the sum of the expression $\frac{1}{3} + \frac{6\sqrt{5}}{7}$ must be rational because it is a fraction. Is Jakob correct? Explain.

8. 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.

9. An example of a sixth-degree polynomial with a leading coefficient of seven and a constant term of four is
1) $6x^7 - x^5 + 2x + 4$
2) $4 + x + 7x^6 - 3x^2$
3) $7x^4 + 6 + x^2$
4) $5x + 4x^6 + 7$

10. What is the product of $2x + 3$ and $4x^2 - 5x + 6$?
1) $8x^3 - 2x^2 + 3x + 18$
2) $8x^3 - 2x^2 - 3x + 18$
3) $8x^3 + 2x^2 - 3x + 18$
4) $8x^3 + 2x^2 + 3x + 18$

11. What is the result when $4x^2 - 17x + 36$ is subtracted from $2x^2 - 5x + 25$?
1) $6x^2 - 22x + 61$
2) $2x^2 - 12x + 11$
3) $-2x^2 - 22x + 61$
4) $-2x^2 + 12x - 11$

12. Solve for x:

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

13. What is the smallest integer value that satisfies the following inequality:

$$47 - 4x < 7$$

14. The volume of a trapezoidal prism can be found using the formula $V = \frac{1}{2}a(b+c)h$. Which equation is correctly solved for b?

1) $b = \frac{V}{2ah} + c$

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

3) $b = \frac{2V}{ah} + c$

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

15. Franklin has a jar full of nickels and dimes in a jar that he is bringing to the bank. He has one less than twice as many nickels are dimes. If his coins have a value of $5.95, how many nickels does he have?

16. 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.

17. Tanya is making homemade greeting cards. She goes to the craft store to purchase cards and other materials needed for decorating the cards. The data table below represents the amount she spends in dollars, $f(x)$, in terms of the number of cards she makes, x. The data can be represented by the equation $f(x) = .75x + 4.5$. Explain what the slope and y-intercept of $f(x)$ mean in the given context.

x	f(x)
4	7.50
6	9
9	11.25
10	12

18. 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) $c = 60 + 0.05d$

19. Solve the following system algebraically for all values of x and y:
-2x + 5y = 11
2x + 3y = 13

20. The Celluloid Cinema sold 150 tickets to a movie. Some of these were child tickets and the rest were adult tickets. A child ticket cost $7.75 and an adult ticket cost $10.25. If the cinema sold $1470 worth of tickets, which system of equations could be used to determine how many adult tickets, a, and how many child tickets, c, were sold?

1) $a + c = 150$

   $10.25a + 7.75c = 1470$

2) $a + c = 1470$

 $10.25a + 7.75c = 150$

3) $a + c = 150$

   $7.75a + 10.25c = 1470$

4) $a + c = 1470$

   $7.75a + 10.25c = 150$

21. 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?

22. Write the equation of the line passing through (8,2) and (6,4) in both point slope and slope intercept form

23. 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.

Number of Computers

Number of Printers
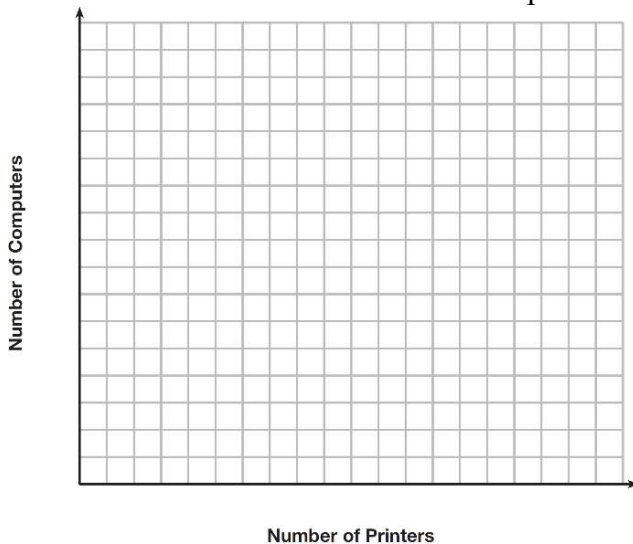
24. Graph the following systems of inequalities on the set of axes below:
Based upon your graph, explain why $(6, 1)$ is a solution to this system and why $(-6, 7)$ is *not* a solution to this system.

$2y \geq 3x - 16$

$y + 2x > -5$
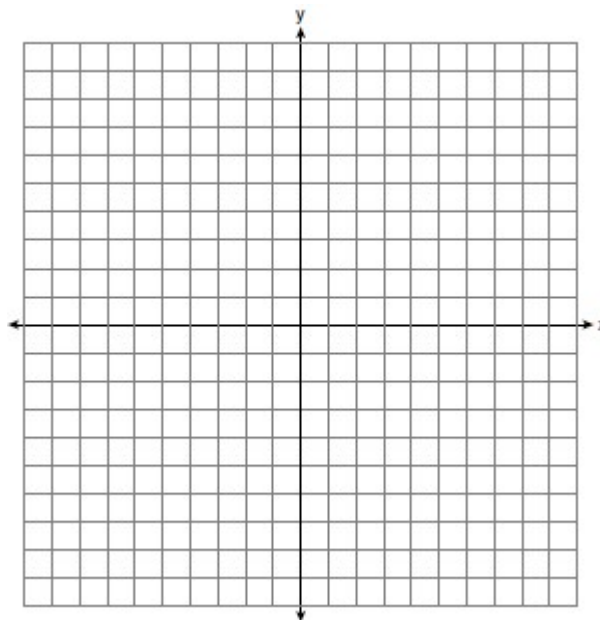
25. A car worth $41,235 depreciates at a rate of 11.5% each year. Find the value of the car after 7 years to the nearest cent?

26. A population of rabbits in a lab, $p(x)$, can be modeled by the function $p(x) = 20(1.014)^x$, where x represents the number of days since the population was first counted. Explain what 20 and 1.014 represent in the context of the problem.

27. Which scenario represents exponential growth?
1) A water tank is filled at a rate of 2 gallons/minute.
2) A vine grows 6 inches every week.
3) A species of fly doubles its population every month during the summer.
4) A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

28. Caleb claims that the ordered pairs shown in the table below are from a nonlinear function. State if Caleb is correct. Explain your reasoning.

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

Factor the following expressions

29. $9x^2 - 49$

30. $x^2 - 9x - 22$

31. $3x^2 - 12$

32. $4x^2 - 12x - 40$

33. Solve for x:
$x(x + 5) = 11x + 27$

34. Solve the following system for all values of x and y:
$y = x^2 - 4x + 3$
$y + 1 = x$

35. Express $5\sqrt{12} \bullet 2\sqrt{6}$ in simplest radical form

36. Express $k\sqrt{200} - 2k\sqrt{18}$ in simplest radical form

37. Express $\dfrac{3}{2\sqrt{5}}$ in simplest radical form

38. Solve algebraically for x rounding all values to the *nearest tenth*.
$2x^2 + 5x = 6$

39. 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) $(x + 3)^2 = 16$

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

41. Jordan and Aaron are brothers. Jordan's age is four more than Aaron's age. If the product of their ages is 32, how old is Jordan?

42. The zeros of the function $p(x) = x^2 - 2x - 24$ are
1) −8 and 3
2) −6 and 4
3) −4 and 6
4) −3 and 8

43. The graph below represents the parabolic path of a ball kicked by a young child. What are the vertex and the axis of symmetry for the parabola?

1) vertex: $(3,8)$; axis of symmetry: $x = 3$
2) vertex: $(3,8)$; axis of symmetry: $y = 3$
3) vertex: $(8,3)$; axis of symmetry: $x = 3$
4) vertex: $(8,3)$; axis of symmetry: $y = 3$
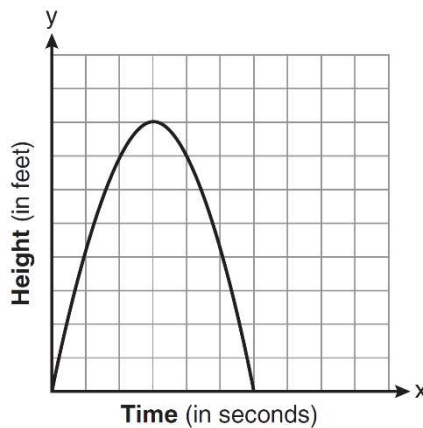
44. Re-write $f(x) = x^2 + 12x + 2$ in vertex form and state the vertex

45. The height of a ball Doreen tossed into the air can be modeled by the function
$h(x) = -4.9x^2 + 6x + 5$, where x is the time elapsed in seconds, and $h(x)$ is the height in meters. The number 5 in the function represents

1) the initial height of the ball

2) the time at which the ball reaches the ground

3) the time at which the ball was at its highest point

4) the maximum height the ball attained when thrown in the air

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. Over what interval is the graph increasing?

Height (units)

Time (in seconds)
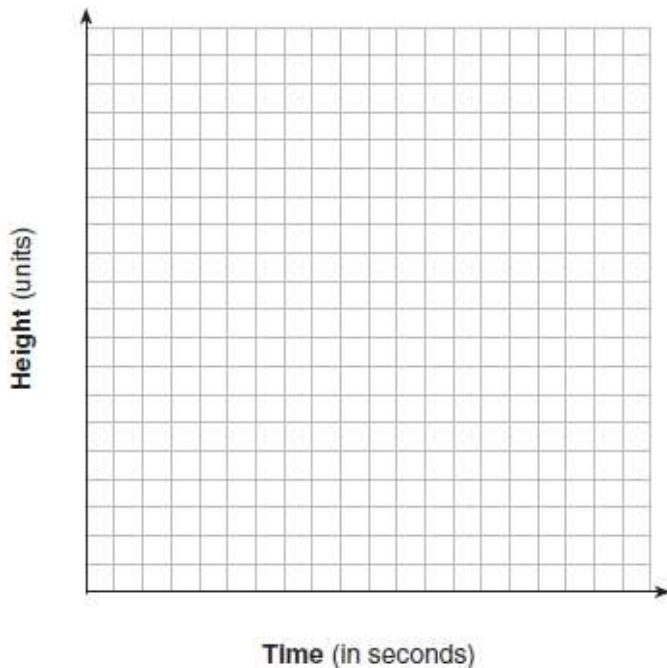
47. When an apple is dropped from a tower 256 feet high, the function $h(t) = -16t^2 + 256$ models the height of the apple, in feet, after t seconds. Determine, algebraically, the number of seconds it takes the apple to hit the ground. What would be an appropriate domain in the given context?
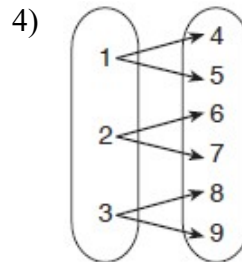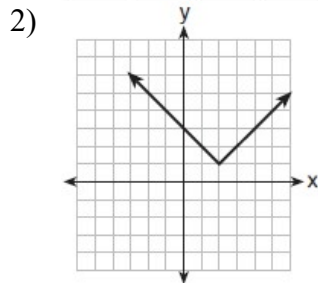
48. Which relation is *not* a function?
1) $\{(2,4),(1,2),(0,0),(-1,2),(-2,4)\}$
2) $\{(2,4),(1,1),(0,0),(-1,1),(-2,4)\}$
3) $\{(2,2),(1,1),(0,0),(-1,1),(-2,2)\}$
4) $\{(2,2),(1,1),(0,0),(1,-1),(2,-2)\}$
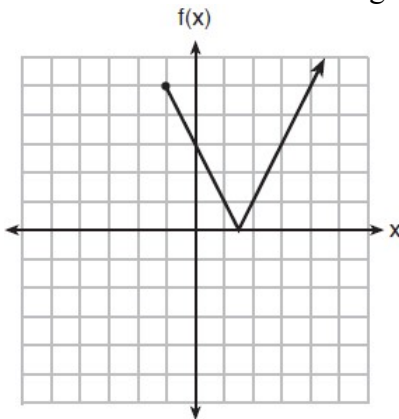

49. Which relation does *not* represent a function?

1)

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

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

2)

4)

50. State the domain and range of the given function:

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

52. At an ice cream shop, the profit, $P(c)$, is modeled by the function $P(c) = 0.87c$, where c represents the number of ice cream cones sold. An appropriate domain for this function is
1) an integer ≤ 0 3) a rational number ≤ 0
2) an integer ≥ 0 4) a rational number ≥ 0

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

b(x)
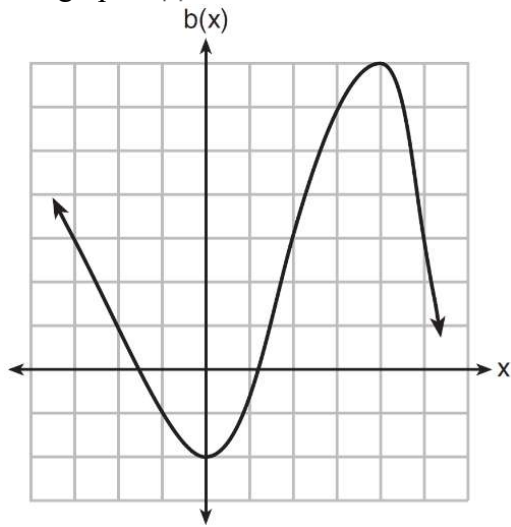
54. When the function $f(x) = x^2$ is multiplied by the value a, where $a > 1$, the graph of the new function, $g(x) = ax^2$
1) opens upward and is wider
2) opens upward and is narrower
3) opens downward and is wider
4) opens downward and is narrower

55. 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. What is the average rate of change of the ball between 1 and 5 seconds? Explain its meaning in the context of the problem.
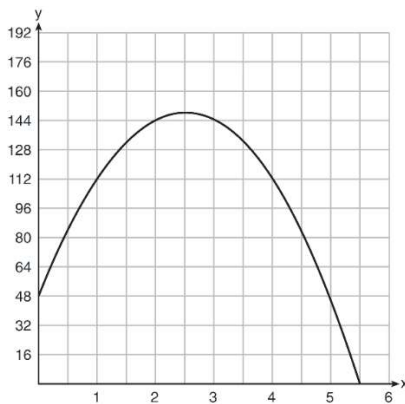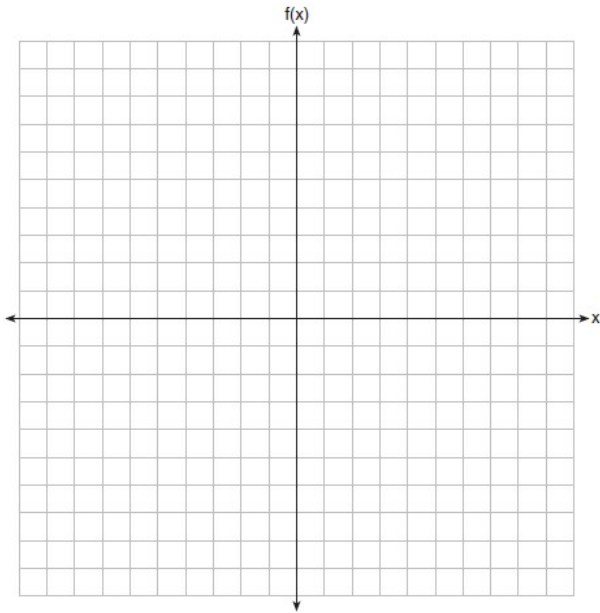
56. The graph below models the height of a remote-control helicopter over 20 seconds during flight. Over which interval does the helicopter have the *slowest* average rate of change?

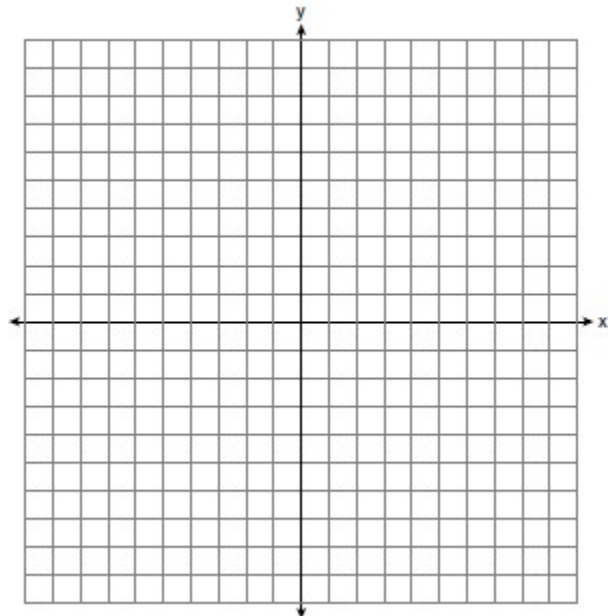1) [0,5]   2) [5,10]   3) [10,15]   4) [15,20]

Height (ft) vs Time (seconds)
Points: (0,46), (5,19), (10,20), (15,14), (20,17)
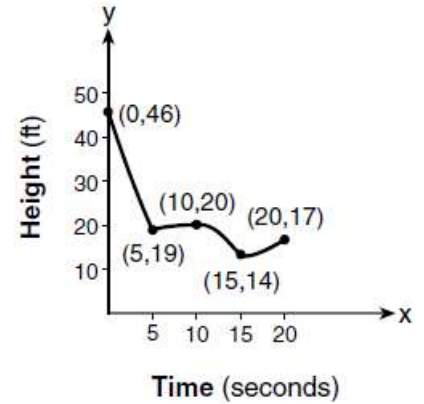
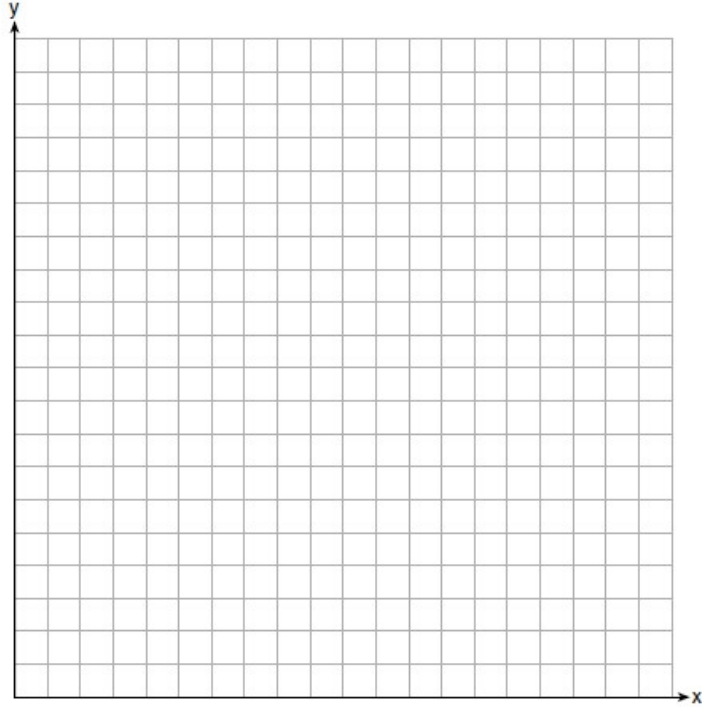57. On the set of axes below, graph $f(x) = |x - 3| + 2$.

f(x)

58. Graph $f(x)$ and $g(x)$ on the set of axes below. Based on your graph, state *one* value of x that satisfies $f(x) = g(x)$. Explain your reasoning.

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

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

59. Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year. Write a system of equations to model this situation, where x represents the number of years since 2010. Graph this system of equations on the set of axes below.

Explain in detail what each coordinate of the point of intersection of these equations means in the context of this problem.

60. The function g is defined as
On the set of axes below, graph $g(x)$.

$$g(x) = \begin{cases} |x + 3|, & x < -2 \\ x^2 + 1, & -2 \leq x \leq 2 \end{cases}$$
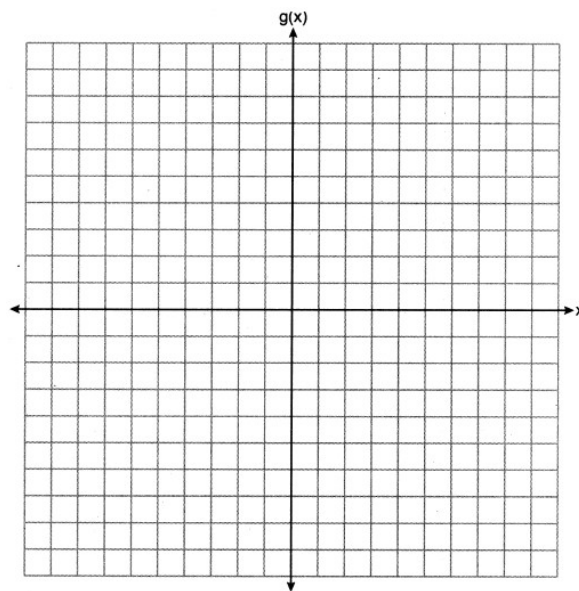
61. During a snowstorm, a meteorologist tracks the amount of accumulating snow. For the first three hours of the storm, the snow fell at a constant rate of one inch per hour. The storm then stopped for two hours and then started again at a constant rate of one-half inch per hour for the next four hours. On the grid below, draw and label a graph that models the accumulation of snow over time using the data the meteorologist collected.
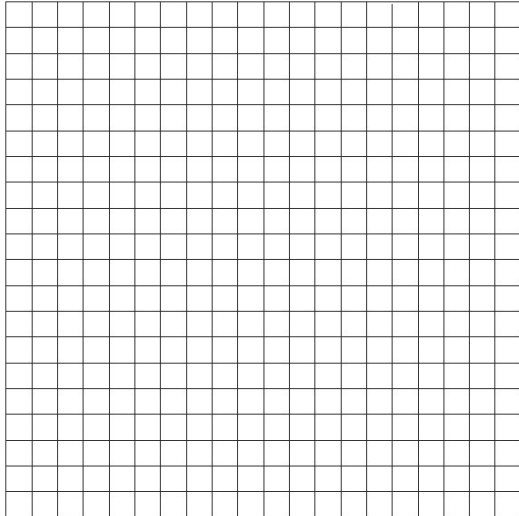
62. The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving. Based on the graph, during which interval did Craig most likely drive in the city? Explain your reasoning. Explain what might have happened in the interval between B and C.
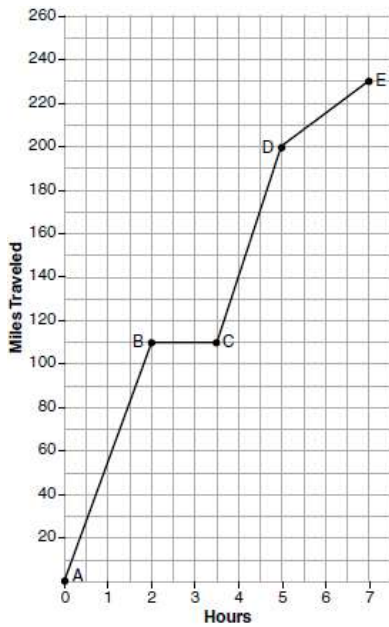
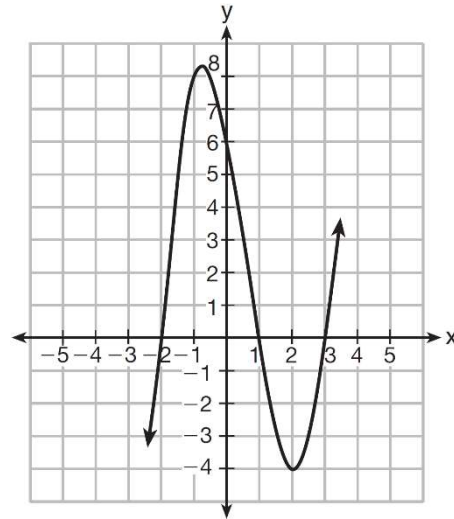63. Which function is shown in the table below?

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

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

64. 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
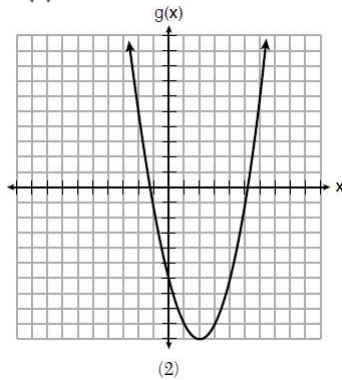

65. Which ordered pair would *not* be a solution to $y = x^3 - x$?

1) $(-4, -60)$
2) $(-3, -24)$
3) $(-2, -6)$
4) $(-1, -2)$

66. Which of the quadratic functions below has the *smallest* minimum value?

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

2)

(2)

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

4)

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

67. Write an equation for the following sequence and find the ninth term.
2,8,32,128,…

68. Write an equation for the following sequence and find the eighth term.
2,- 6, -14, -22, ...

69. The fifth term in an arithmetic sequence is 8 and the ninth term is 28. Write the equation of this sequence.

70. At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below. State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data. Explain what the correlation coefficient means with regard to the context of this situation.

| Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

71. Jenna took a survey of her senior class to see whether they preferred pizza or burgers. The results are summarized in the table below.

|	Pizza	Burgers
Male	23	42
Female	31	26

Of the people who preferred burgers, approximately what percentage were female?
1) 21.3
2) 38.2
3) 45.6
4) 61.9

72. For the set of data below, find the lower quartile, median, upper quartile, interquartile range, and range.
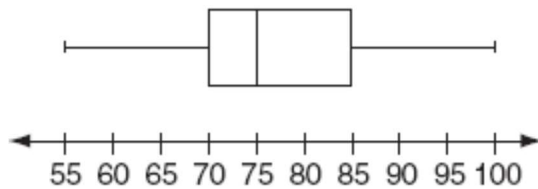
73. The following data represents the number of gallons of paint in a paint order in a given day. For this set of data, find the mean, median, mode, population standard deviation, range, and interquartile range. How many paint orders were placed on this day?
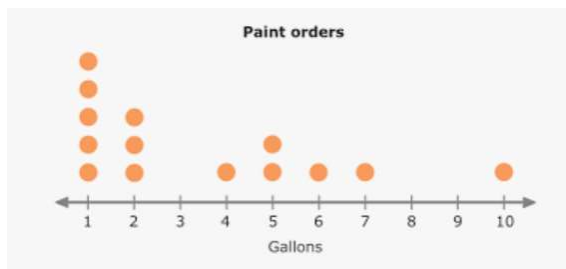
74. Which relationship can best be described as causal?
1) height and intelligence
2) shoe size and running speed
3) number of correct answers on a test and test score
4) number of students in a class and number of students with brown hair

75. A news report suggested that an adult should drink a minimum of 4 pints of water per day. Based on this report, determine the minimum amount of water an adult should drink, in fluid ounces, per week.

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

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

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

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

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