Quadratics

Student _____

Class _____

Date _____

1. Which expression is equivalent to $(2x - 3)(x^2 - 2x + 1)$?

   A. $2x^3 + 7x^2 + 8x + 3$

   B. $2x^3 - x^2 + 8x - 3$

   C. $2x^3 - 7x^2 + 8x - 3$

   D. $2x^3 + x^2 + 8x - 3$

2. What is the product of $(2x + 1)$ and $(2x - 1)$?

   A. $4x^2$

   B. $4x^2 - 1$

   C. $4x^2 - 2x + 1$

   D. $4x^2 - 4x - 1$

3. $\left(4a^2 + 7a - 2\right) - \left(7a^2 - a - 2\right) =$

   A. $-3a^2 + 6a$

B. $-3a^2 + 8a$

C. $-3a^2 + 6a - 4$

D. $-3a^2 + 8a - 4$

4. Which polynomial expresses the difference of the two polynomials below?

$$\left(-8k^4 + 3k^3 - 6\right) - \left(9k^4 - 11k^3 + 2\right)$$

A. $-17k^4 + 14k^3 - 8$

B. $-17k^4 + 14k^3 - 4$

C. $-17k^4 - 8k^3 - 8$

D. $-17k^4 - 8k^3 - 4$

5. Which expression is equivalent to $\left(6x^8 + 7x^7 - 3x^6 + 1\right) - \left(3x^8 - 4x^7 + 7x^6 - 6\right)$?

A. $3x^8 + 3x^7 + 4x^6 - 5$

B. $9x^8 + 3x^7 + 4x^6 - 5$

C. $9x^8 + 3x^7 + 4x^6 + 7$

D. $3x^8 + 11x^7 - 10x^6 + 7$

6. Which is a simplified form of the expression below?

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

A. $-15x^2+8x$

B. $-9x^2+5x$

C. $-9x^2-11x$

D. $15x^2-8x$

7. What is the product of $\left(b^2-2b+4\right)$ and $(b-2)$?

A. b^3-4b+4

B. b^3+4b+4

C. b^3-4b^2+8b-8

D. b^3+4b^2+8b-8

8. A company has decided that the various boxes they need for shipments will each have a height of 4 inches (in.), a depth of $(2x-7)$ in., and a width of $(x^2-13x+11)$ in. for various values of x.

a) What simplified polynomial expression, in terms of x, can be used to describe the volume of a box, in cubic inches?

b) What simplied polynomial expression, in terms of x, can be used to describe the surface area of a box, in square inches?

Show work.

9. Which expression is equivalent to $7x^6 - 2x^3\left(3x^3 - 1\right) - x^6$?

A. $-2x^3$

B. $2x^3$

C. $6x^6 - 6x^9 + 2x^3$

D. $6x^6 - 6x^9 - 2x^3$

10. Simplify the following expression. Put your answer in simplest form.
$t + \frac{2t}{5} - \frac{3t}{15}$

A. $\frac{6t}{5}$

B. $\frac{6t}{15}$

C. $\frac{10t}{15}$

D. $\frac{18t}{15}$

11. Which expression is equivalent to
$6x^4 - 7x^2 - 20$?

A. $(2x^2-5)(3x^2+4)$

B. $(6x^2-7)(x^2-20)$

C. $(2x^2-3x+12)+(4x^2-4x-32)$

D. $(9x^4+10x^2-10)-(3x^4-17x^2-10)$

12. $\left(3x^2-4x+7\right)-\left(-2x^2+x+5\right)=$

A. x^2-5x+2

B. $x^2-3x+12$

C. $5x^2-5x+2$

D. $5x^2-3x+12$

13. $-3y^3(3y-4xy)=$

A. $-6y^4-7xy^4$

B. $-9y^4-4xy$

C. $-9y^4-12xy^4$

D. $-9y^4+12xy^4$

14. Which property can be used to justify that $x^2 + 4x - 10 + x^3 + 5x^2 - 6x + 3 = x^3 + x^2 + 5x^2 + 4x - 6x - 10 + 3$?

A. associative property

B. distributive property

C. substitution property

D. commutative property

15. Which expression is equivalent to $(x + 4)^2 - (x + 4)$?

A. $x^2 - x + 12$

B. $x^2 - x + 20$

C. $x^2 + 7x + 12$

D. $x^2 + 7x + 20$

16. The length and width of a rectangular park are determined by the polynomials $(3x + 4)$ and $(2x - 3)$.

- Write a polynomial expression, in the most simplified form and in terms of x, that determines the perimeter of the given park.
- What is the area of the given park, in the most simplified form and in terms of x?

Use words, numbers, and/or pictures to show your work.

17. Which polynomial is equivalent to $(z+3)^2$?

A. z^2+6z+9

B. z^2-6z+9

C. $2z+6$

D. z^2+9

18. A rectangle has a length of $2x-5$ units and a width of $x-3$ units. What is the area, in square units, of the rectangle?

A. $2x^2-15$

B. $2x^2+15$

C. $2x^2-11x-15$

D. $2x^2-11x+15$

19. Which represents the product of x and $y+4$?

A. $x+4y$

B. $x+y+4$

C. $xy+4$

D. $xy+4x$

20. What is the sum of $(3q - 2) + (4q - 3)$?

A. $12q^2 - 17q + 6$

B. $7q^2 - 5$

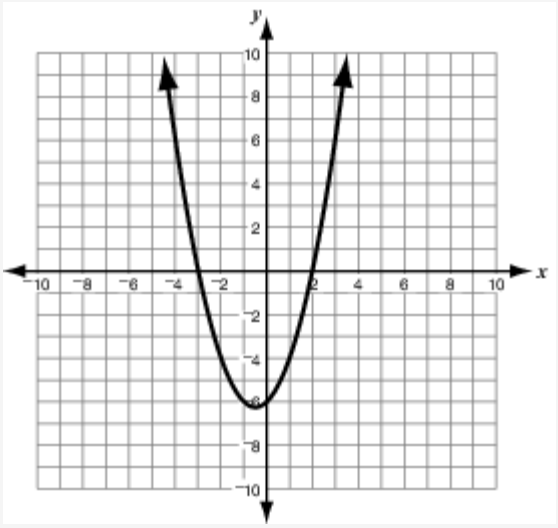
C. $7q - 5$

D. $2q$

21. At what point(s) does the graph of the polynomial $q(x) = x^2 - 4$ intersect the *x*-axis?

22. What are the zeros of the function $f(x) = 4x - x^3$?

23. Which of these could represent the factors of the polynomial graphed below?



A. $(x+3)(x+2)$

B. $(x-3)(x-2)$

C. $(x-3)(x+2)$

D. $(x+3)(x-2)$

24. At which points does the graph of the polynomial $f(x)=x^3+5x^2+6x$ intersect the x-axis?

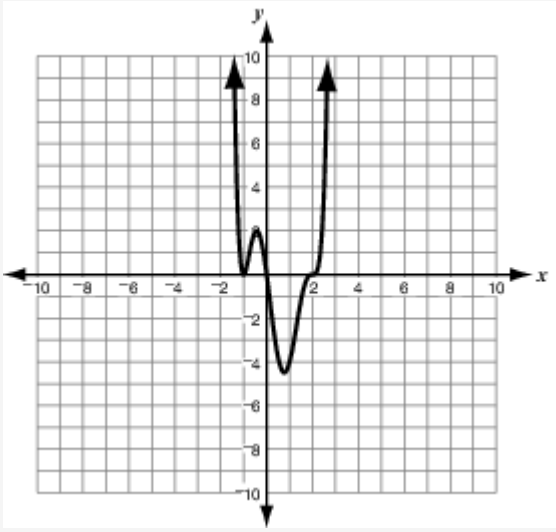
A. -3, -2, and 0

B. 0, 2, and 3

C. -3 and -2

D. 2 and 3

25. Which function **best** represents the graph below?



A. $f(x)=(x+1)(x-2)$

B. $f(x)=x(x+1)(x-2)$

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

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

26. The 3rd-degree polynomial function $P(x)$ has roots at $-3, -1,$ and $14,$ and a y-intercept of $6.$ Which of the following statements MUST be true?

A. $P(6) = 0$

B. $P(4) = 50$

C. $P(x) \leq 86$ for all real values of x.

D. $P(x)$ has a double root at $x = 14$.

27. What is the end behavior for the polynomial function $f(x) = -6x^4 + 3x^2 - 7$?

A. $x \to -\infty, f(x) \to \infty$
$x \to \infty, f(x) \to -\infty$

B. $x \to -\infty, f(x) \to \infty$
$x \to \infty, f(x) \to \infty$

C. $x \to -\infty, f(x) \to -\infty$
$x \to \infty, f(x) \to -\infty$

D. $x \to -\infty, f(x) \to -\infty$
$x \to \infty, f(x) \to \infty$

28. Four functions are listed below.

$f(x)$	$(x^2 - 4)(x - 1)$
$g(x)$	$(x + 4)(x - 6)$
$h(x)$	$(x^2 + 6)$
$k(x)$	$x(x^2 - 25)$

Which two functions, when graphed, have the same number of x-intercepts?

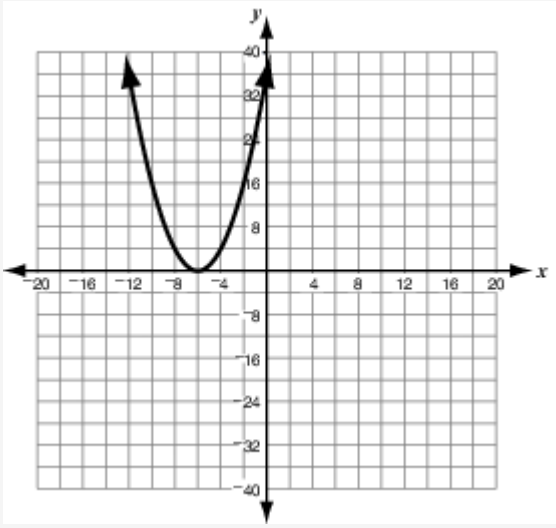
A. $f(x)$ and $g(x)$

B. *g(x) and h(x)*

C. $h(x)$ and $k(x)$

D. $k(x)$ and $f(x)$

29. Which function, when graphed, would have the same zero(s) as the function below?



A. $f(x) = x(x+6)$

B. $f(x) = x(x-6)$

C. $f(x) = (x+6)^2$

D. $f(x) = (x-6)^2$

30. Let $p(x) = -x^2+5x-4.$ Which statement describes the graph of $p(x)$?

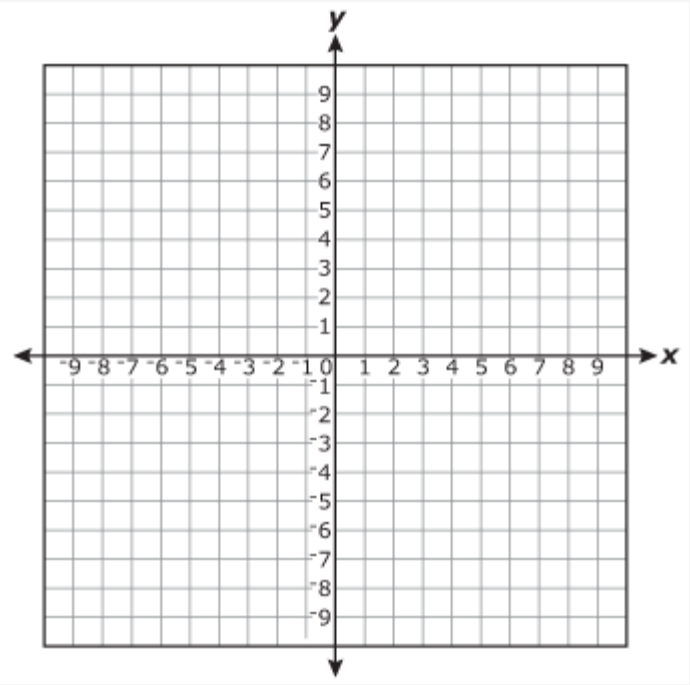
A. The graph has no *x*-intercepts and opens upward from its vertex, the minimum point.

B. The graph has 2 *x*-intercepts and opens downward from its vertex, the maximum point.

C. The graph has 2 *x*-intercepts and opens upward from its vertex, the minimum point.

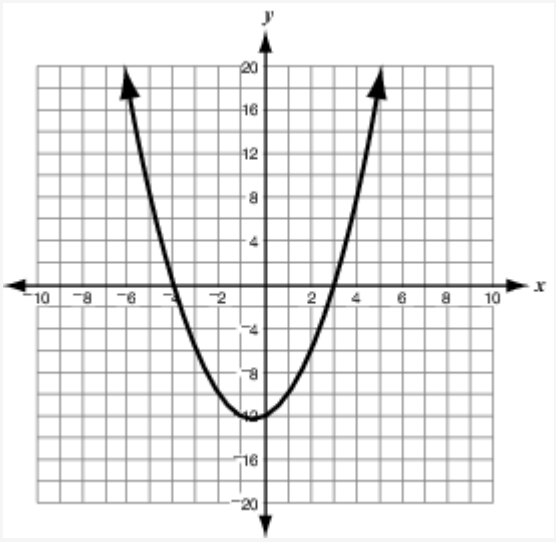
D. The graph has no *x*-intercepts and opens downward from its vertex, the maximum point.

31. Sketch a graph of the polynomial function $f(x) = x^3+x^2-4x-4.$ Label the *x*- and *y*-intercepts.

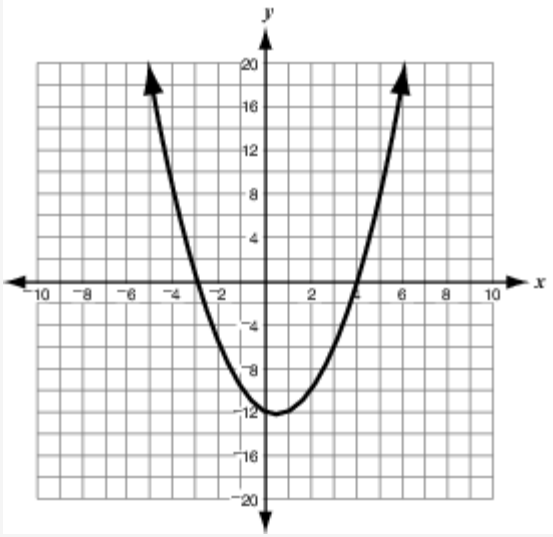


32. Which graph **best** represents the function $f(x) = (x-3)^2(x+4)$?

A.



B.


y
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12
8
4
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−6
−4
−2
2
6
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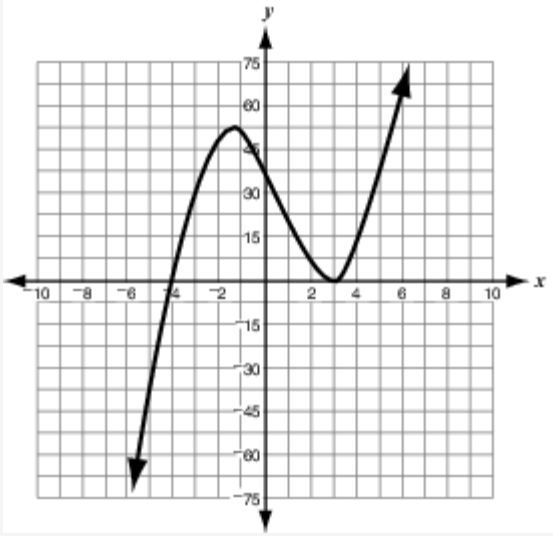
−8
−12
−16
−20

C.


y
x
75
60
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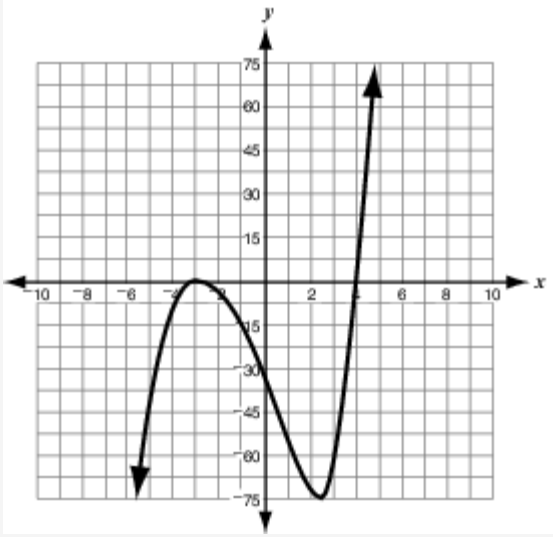
−60
−75

D.



33. Which polynomial has exactly 2 positive x-intercepts?

A. $y = x^3 - 7x + 6$

B. $y = x^3 - 7x - 6$

C. $y = x^3 + 4x^2 + x - 6$

D. $y = x^3 - 6x^2 + 11x - 6$

34. Let the function $f(x) = (x+4)(x^2-36)(x^2+25)$. What are all the x-intercepts for the graph of $f(x)$?

A. $-4, 6$

B. $-6, -4, 6$

C. $-6, 4, 6$

D. $-6, -5, 4, 5, 6$

35. What is the x-intercept of the graph of $y = (x - 5)^2$?

A. -25

B. -5

C. 5

D. 25

36. For which of the following equations is $x = -2$ not a solution?

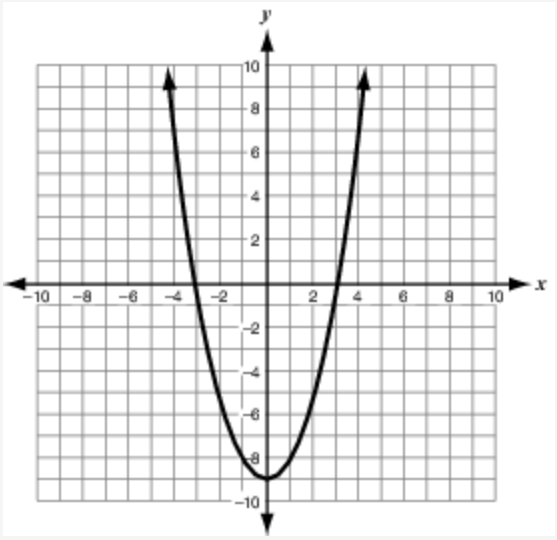
A. $|x| = 2$

B. $x^2 = 4$

C. $(x + 2)(x - 3) = 6$

D. $(3x + 6)(x - 3) = 0$

37. Based on factoring, which equation **best** represents the graph below?



A. $y = x^2 - 3$

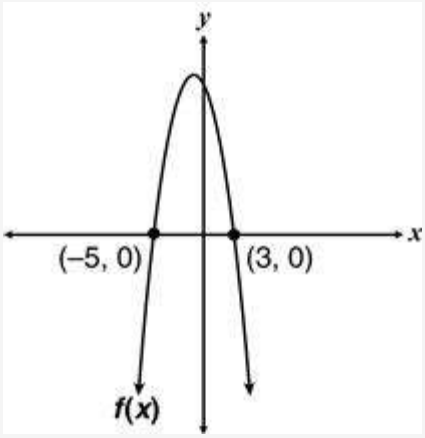
B. $y = x^2 - 9$

C. $y = 3x^2 - 3$

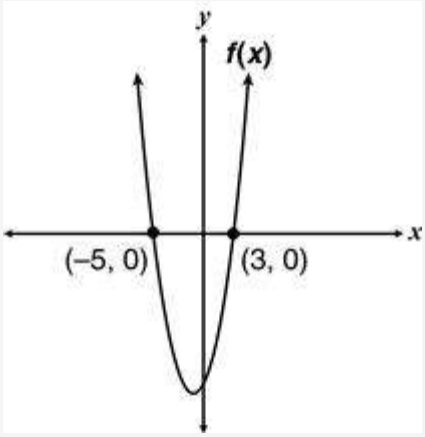
D. $y = 9x^2 - 1$

38. The function $f(x)$ opens upward, and its zeros are –5 and 3. Which graph best represents $f(x)$?

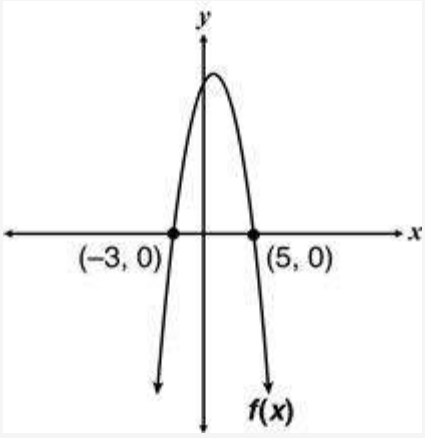
A.



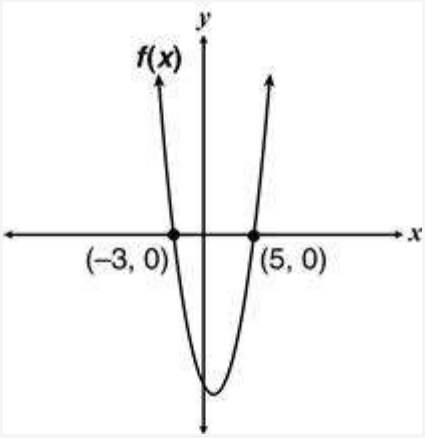
B.



C.



D.



39. What are the zeros of the polynomial function below?

$$f(x) = (x^2 - 16)(x + 5)x$$

A.
$-5, -4, 0, 4$

B.
$-4, 0, 4, 5$

C.
$-5, -4, 4$

D.
$-5, 0, 4$

40. The roots of a quadratic equation are 6 and $\frac{3}{4}$. If one of the two factors of the equation is $x - 6$, what is the second factor?

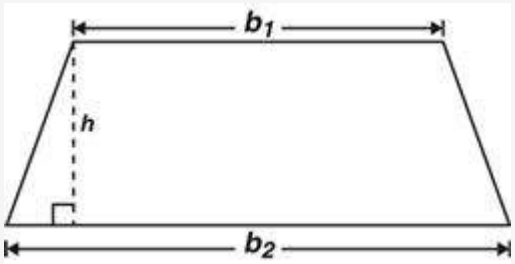
A. $3x - 4$

B. $3x + 4$

C. $4x - 3$

D. $4x + 3$

41. The area of the trapezoid below can be found by using the formula $A = \frac{1}{2}h(b_1 + b_2)$.



The area of this trapezoid is 16 square inches. If $b_1 = h$ and $b_2 = h + 12$, what is the value of h?

A. 2

B. 8

C. 10

D. 14

42. What are the values of x in the equation $(2x + 5)^2 = 9$?

A. $\{-4, -1\}$

B. $\{-4, 1\}$

C. $\{-1, 4\}$

D. $\{1, 4\}$

43. What are the solutions to $\frac{x^2}{44} = \frac{x}{11} - 1$?

A. $2 + \sqrt{3}$ and $2 - \sqrt{3}$

B. $-2 + 4\sqrt{3}$ and $-2 - 4\sqrt{3}$

C. $2 + 2i\sqrt{10}$ and $2 - 2i\sqrt{10}$

D. $-2 + 4i\sqrt{10}$ and $-2 - 4i\sqrt{10}$

44. Andrew dropped a rock from a cliff 49 meters high. The function $h(t) = -4.9t^2 + 49$ represents the height of the rock, in meters, t seconds after he dropped it. Approximately how many seconds did the rock take to reach the ground?

A. 3

B. 4

C. 10

D. 49

45. An object fell to the ground from a height of 288 feet. The equation $0 = 288 - 48t - 16t^2$ can be used to determine t, the time in seconds it took for the object to hit the ground. At what time did the object hit the ground?

A. 2 seconds

B. 3 seconds

C. 6 seconds

D. 9 seconds

46. Which value is a root of the equation $x^2 + 3x - 7 = 0$?

A. $\frac{-3 + \sqrt{19}}{2}$

B. $\frac{-3 + \sqrt{37}}{2}$

C. $\frac{3 - \sqrt{19}}{2}$

D. $\frac{3 - \sqrt{37}}{2}$

47. Using factoring, what are the solutions to the equation $x^2 + 9x + 8 = 0$?

A. $x = -2$ or $x = -4$

B. $x = -1$ or $x = -8$

C. $x = 1$ or $x = 8$

D. $x = 2$ or $x = 4$

48. What is the solution set for the equation $x^2 + 9x = -5$?

A. $\left\{\frac{-9 \pm \sqrt{61}}{2}\right\}$

B. $\left\{\frac{9 \pm \sqrt{61}}{2}\right\}$

C. $\left\{\frac{-9 \pm \sqrt{101}}{2}\right\}$

D. $\left\{\frac{9 \pm \sqrt{101}}{2}\right\}$

49. Which expression represents a solution to the equation $x^2 + 2x - 10 = 0$?

A. $x = 1 - 2\sqrt{11}$

B. $x = 1 - \sqrt{11}$

C. $x = -1 + \sqrt{11}$

D. $x = -1 + 2\sqrt{11}$

50. What are the solutions to $(x - 2)(x - 4) = -1.04$?

A. $3 + 0.2i$ and $3 - 0.2i$

B. $6 + 0.2i$ and $6 - 0.2i$

C. 0.96 and 2.96

D. 2 and 4

51. Using factoring, which values are the solutions to the quadratic equation $2m^2 + 7m - 30 = 0$?

A. $m = -10$ or $m = \frac{3}{2}$

B. $m = -6$ or $m = \frac{5}{2}$

C. $m = -5$ or $m = 3$

D. $m = 6$ or $m = -\frac{5}{2}$

52. What is the solution set for the following equation?

$x^2 - 11x = 12$

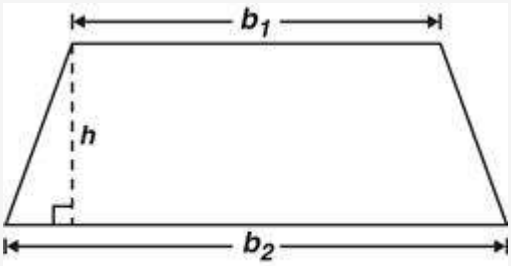
A. $\{-12, 1\}$

B. $\{-1, 12\}$

C. $\{1, 12\}$

D. $\{12, 23\}$

53. The area of a trapezoid can be found by the formula $A = \frac{1}{2}h(b_1 + b_2)$.



Note: Figure not drawn to scale

The area of this trapezoid is 15 square inches. If $b_1 = h$ and $b_2 = h + 4$, find the length of h in inches.

A. 3

B. 5

C. 7

D. 13

54. A ball is thrown upward at a velocity of 15 meters per second from a height that is 20 meters above the ground. The height h (in meters) of the ball at time t (in seconds) after it is thrown can be found by the formula below.

$h = -5t^2 + 15t + 20$

Find the time when the ball is again 20 meters above the ground.

A. 1 second

B. 2 seconds

C. 3 seconds

D. 4 seconds

55. What are the solutions for x in the equation $x^2 - 102x + 200 = 0$?

A. 2 or 100

B. 4 or 50

C. 8 or 25

D. 10 or 20

56. What are the solutions to the equation $x^2 - 7x - 30 = 0$?

A. $x = -3$ or $x = -10$

B. $x = -3$ or $x = 10$

C. $x = 3$ or $x = -10$

D. $x = 3$ or $x = 10$

57. Which function is related to the quadratic equation that has –6 as its only solution?

A. $f(x) = x^2 + 12x + 36$

B. $f(x) = x^2 - 12x + 36$

C. $f(x) = x^2 - 36$

D. $f(x) = x^2 + 6$

58. Which value of $x > 0$ is a solution to $(x - 12)(x + 8) = 0$?

A. $x = -12$

B. $x = -8$

C. $x = 8$

D. $x = 12$

59. What is the solution to the quadratic equation $9x^2 + 30x + 25 = 0$?

A. $-\frac{5}{3}$

B. $-\frac{3}{5}$

C. $\frac{3}{5}$

D. $\frac{5}{3}$

60. What are the solutions for x in the equation $x^2 + 6x + 3 = 0$?

A. $x = 6$ or $x = 3$

B. $x = -2$ or $x = -3$

C. $x = -3 + 2\sqrt{3}$ or $x = -3 - 2\sqrt{3}$

D. $x = -3 + \sqrt{6}$ or $x = -3 - \sqrt{6}$

61. The first two steps in solving the equation $2x^2 + 5x - 3 = 0$ by completing the square are shown below.

Step 1: $2x^2 + 5x = 3$
Step 2: $x^2 + \frac{5}{2}x = \frac{3}{2}$
Step 3: ?

Which equation is Step 3 in the solution?

A. $x^2 + \frac{5}{2}x + \frac{5}{2} = \frac{3}{2} + \frac{5}{2}$

B. $x^2 + \frac{5}{2}x + \frac{5}{4} = \frac{3}{2} + \frac{5}{4}$

C. $x^2 + \frac{5}{2}x + \frac{25}{4} = \frac{3}{2} + \frac{25}{4}$

D. $x^2 + \frac{5}{2}x + \frac{25}{16} = \frac{3}{2} + \frac{25}{16}$

62. If the quadratic formula is used to solve $x^2 + 3x - 1 = 0$, what value should be substituted for *n* in the following equation?

$$x = \frac{-3 \pm \sqrt{n}}{2}$$

A. 2

B. 5

C. 7

D. 13

63. What is the solution set to the quadratic equation shown below?

$$\left(x-\frac{7}{4}\right)^2=-\frac{1}{4}$$

A. $x=\frac{\sqrt{7}}{2}\pm\frac{1}{2}i$

B. $x=\frac{7}{4}+\frac{1}{2}i$

C. $x=\frac{7}{4}\pm\frac{1}{2}i$

D. $x=\frac{7}{4}\pm\frac{1}{2}$

64. An object is thrown upward out of a building window. The equation $h=-16t^2+40t+24$ models the height in feet, h, of the object above the ground t seconds after it is thrown. How long does it take for the object to hit the ground?

A. $\frac{1}{2}$second

B. 1 second

C. $1\frac{1}{2}$ seconds

D. 3 seconds

65. An equation in the form $ax^2 + bx + c = 0$ is solved by the quadratic formula. The solution to the equation is shown below.

$$x = \frac{-3 \pm \sqrt{17}}{2}$$

What are the values of *a, b,* and *c* in the quadratic equation?

A. $a = 1,\ b = 3,\ c = -2$

B. $a = 1,\ b = -3,\ c = -2$

C. $a = 2,\ b = -3,\ c = -1$

D. $a = 2,\ b = 3,\ c = -1$

66. Solve the equation. Simplify your answer completely.

$$x^2 + 6x - 13 = 0$$

67. What values of x satisfy $2x^2 - 4x + 5 = 0$?

A. $\left\{-1 + \frac{\sqrt{6}}{2}, -1 - \frac{\sqrt{6}}{2}\right\}$

B. $\left\{-1+\frac{\sqrt{6}}{2}i,-1-\frac{\sqrt{6}}{2}i\right\}$

C. $\left\{1+\frac{\sqrt{6}}{2},1-\frac{\sqrt{6}}{2}\right\}$

D. $\left\{1+\frac{\sqrt{6}}{2}i,1-\frac{\sqrt{6}}{2}i\right\}$

68. To find the roots of the quadratic equation $2x^2-4x+3=0$, Carla correctly applied the quadratic formula. Which of the following is that correct application?

A. $x=\frac{-4\pm\sqrt{(-4)^2-4(2)(3)}}{2(2)}$

B. $x=\frac{-4\pm\sqrt{(-4)^2-4(-4)(3)}}{2(2)}$

C. $x=\frac{-(-4)\pm\sqrt{(4)^2-4(2)(3)}}{2(2)}$

D. $x=\frac{-(-4)\pm\sqrt{(-4)^2-4(2)(3)}}{2(2)}$

69. Which expression represents the solutions for the equation $2z^2-6z+3=0$?

A. $\frac{3\pm\sqrt{3}}{2}$

B. $\frac{3 \pm 2\sqrt{3}}{2}$

C. $\frac{3 \pm \sqrt{15}}{2}$

D. $\frac{3 \pm 2\sqrt{15}}{2}$

70. Elise solved the quadratic equation $2x^2 + 9x + 4 = 0$ by completing the square. The first two steps of her solution are shown.

Step 1: $x^2 + \frac{9x}{2} + 2 = 0$

Step 2: $x^2 + \frac{9x}{2} = -2$

Step 3: _____

What should be Step 3 in solving the equation by completing the square?

A. $x^2 + \frac{9x}{2} + \frac{9}{4} = -2 + \frac{9}{4}$

B. $x^2 + \frac{9x}{2} + \frac{81}{16} = -2 + \frac{81}{16}$

C. $x^2 + \frac{9x}{2} - \frac{9}{4} = -2 - \frac{9}{4}$

D. $x^2 + \frac{9x}{2} - \frac{81}{16} = -2 - \frac{81}{16}$

71. What is the solution set of the equation $(x - 9)(x) = 2x - 5x - 8$?

A. $\{2, 4\}$

B. $\{2, -4\}$

C. $\{-2, 4\}$

D. $\{-2, -4\}$

72. To find the roots of the quadratic equation $3x^2 - 2x + 1 = 0$, Carla correctly applied the quadratic formula. Which of the following is that correct application?

A. $x = \frac{-2 \pm \sqrt{(-2)^2 - 4(3)(1)}}{2(3)}$

B. $x = \frac{-2 \pm \sqrt{(-2)^2 - 4(-2)(1)}}{2(3)}$

C. $x = \frac{-(-2) \pm \sqrt{(2)^2 - 4(3)(1)}}{2(3)}$

D. $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(1)}}{2(3)}$

73. What are the solutions to the equation $4x^2 + 7x - 2 = 0$?

A. -2 or $\frac{1}{4}$

B. -1 or $\frac{1}{2}$

C. 1 or $-\frac{1}{2}$

D. 2 or $-\frac{1}{4}$

74. What are the solutions to the equation

$ax^2 - 11x + c = 0$?

A. $x = \frac{11 \pm \sqrt{121 - 4ac}}{2a}$

B. $x = \frac{11 \pm \sqrt{-121 - 4ac}}{2a}$

C. $x = \frac{-11 \pm \sqrt{121 - 4ac}}{2a}$

D. $x = \frac{-11 \pm \sqrt{-121 - 4ac}}{2a}$

75. If $x^2 - 8x + 16 = 13$ is solved by completing the square, which of the following is the first step?

A. $(x - 4)^2 = 13$

B. $4\frac{4}{5}$

C. $(x - 16)^2 = 13$

D. $(x - 16)^2 = \pm\sqrt{13}$

76. Which of the following complex numbers represents the solution to the quadratic equation $x^2 + 4x + 5 = 0$?

A. $-2 \pm 2i$

B. $-4 \pm 2i$

C. $-2 \pm i$

D. $-4 \pm i$

77. A ball is thrown in the air. The function $h = 30t - 5t^2$ can be used to find the height (h) of the ball in meters after t seconds. How long does it take the ball to reach a height of 45 meters?

A. $1\frac{4}{5}$ seconds

B. 3 seconds

C. 5 seconds

D. 6 seconds

78. Which expression represents the proper use of the quadratic formula to solve the equation $2x^2 + 7x - 6 = 0$?

A. $\frac{-7 \pm \sqrt{49 - 48}}{4}$

B. $\frac{-7 \pm \sqrt{49 + 48}}{4}$

C. $\frac{7 \pm \sqrt{49 - 48}}{4}$

D. $\frac{7 \pm \sqrt{49 + 48}}{4}$

79. What is the solution set for the following equation?

$x^2 - 8x = 9$

A. $\{-9, 1\}$

B. $\{-1, 9\}$

C. $\{1, 9\}$

D. $\{9, 17\}$

80. Which equation has roots of -1 and 2?

A. $(x-1)(x-2)=0$

B. $(x-1)(x+2)=0$

C. $(x+1)(x-2)=0$

D. $(x+1)(x+2)=0$

81. A system of equations is shown below.

$$\begin{cases} y = -x + 9 \\ x^2 + y^2 - 4x - 12y + 15 = 0 \end{cases}$$

Which statement about this system of equations is true?

A. Both solutions lie in Quadrant I.

B. Both solutions lie in Quadrant II.

C. The solutions lie in Quadrants I and II.

D. The solutions lie in Quadrants III and IV.

82. Which solution is a valid solution in the system below?

$$\begin{cases} y = x^2 + x - 10 \\ y = 2x - 4 \end{cases}$$

A. (2, 0)

B. (4, 4)

C. (1, – 2)

D. (– 2, – 8)

83. What are the solutions of the system of equations $\begin{cases} y = x^2 - 6x + 8 \\ x - y = -2 \end{cases}$?

A. (5, 3) and (2, 0)

B. (6, 8) and (1, 3)

C. (−6, −4) and (−1, 1)

D. (−5, −7) and (−2, −4)

84. Lindsay solved the following system and obtained the given solutions.

$$\begin{cases} y = x^2 - 2 \\ y - 4 = x \end{cases}$$

(– 2, 2) and (3, 7)

Which statement best describes the reasonableness of this solution?

A. The solution (3, 7) is not reasonable because $3^2 - 2$ equals 4.

B. Neither solution is reasonable because $\begin{cases} -2 \neq 2^2 - 2 \\ -2 - 4 \neq 2 \end{cases}$ and $\begin{cases} 3 \neq 7^2 - 2 \\ 3 - 4 \neq 7 \end{cases}$.

C. Both solutions are reasonable because the line will intersect the parabola at the given solutions.

D. Both solutions are reasonable because there are an infinite number of solutions since the domain of both equations is all real numbers.

85. What are the values of x in the solutions to the following system of equations?

$$\begin{cases} y + x^2 - 8 = 0 \\ y + x - 7 = 0 \end{cases}$$

A. $x = \frac{1 \pm \sqrt{5}}{2}$

B. $x = 2\sqrt{2}$

C. $x = \frac{1 \pm \sqrt{61}}{2}$

D. $x = 7$ and $x = 8$

86. Charles solved the following system of equations and found the values of x to be 5 and $\frac{26}{5}$.

$$\begin{cases} y = x^2 - 10x + 23 \\ y = \frac{1}{5}x - 3 \end{cases}$$

Which statement best describes the reasonableness of these solutions?

A. The solutions are unreasonable because the solutions cannot be fractions.

B. The solutions are reasonable because both values make the linear equation true.

C. The solutions are unreasonable because the graph of the linear equation can only intersect the graph of the quadratic equation in 1 point.

D. The solution is reasonable because the graph of the linear equation will intersect the graph of the quadratic equation at $(5, -2)$ and $(\frac{26}{5}, -1\frac{24}{25})$.

87. The following system of equations models the population (n) of two organisms after t days. Solving the system shows that the populations are equal for two values of t.

$$\begin{cases} n = 6t + 8 \\ n = 2t^2 \end{cases}$$

$t = -1 \qquad t = 4$

Which of the following statements supports the validity of these solutions?

A. Both solutions are valid because the graphs of both solutions will intersect at $(-1, 2)$ and $(4, 32)$.

B. Both solutions are valid because $6(-1) + 8 = 2(-1)^2$ and $6(4) + 8 = 2(4)^2$.

C. The solution – 1 is invalid because $6(-1)+8$ equals 2 and $2(-1)^2$ equals – 2.

D. The solution – 1 is invalid because time cannot be negative.

88. What is the solution to the given system?

$$\begin{cases} y = x^2 - 4x + 6 \\ y = x \end{cases}$$

A. (2, 2)

B. (2, 2) and (3, 3)

C. (1, 1), (2, 2,), (3, 3) . . . . .

D. No solution

89. Emilio correctly solved the system for x.

$$\begin{array}{r} y = x^2 + 4 \\ y = x - 3 \\ \hline 0 = x^2 - x + 7 \end{array}$$

$$x = \frac{1 \pm \sqrt{-27}}{2}$$

Based on these values for x, which statement about the solutions to this system is true?

A. There are no real solutions to the system.

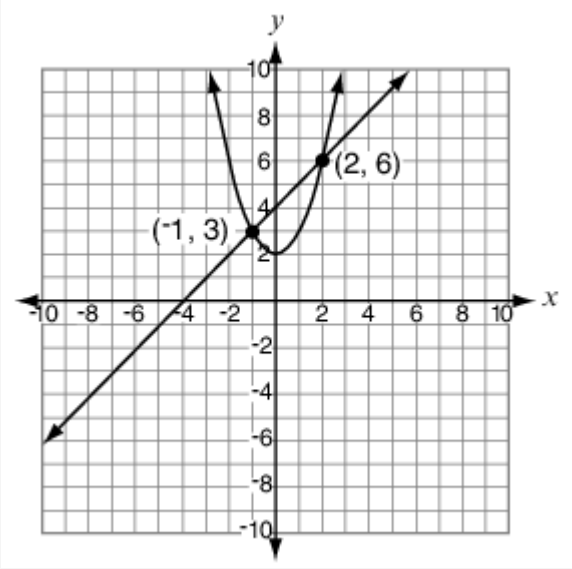
B. There are two real solutions to the system.

C. There is only one real solution to the system.

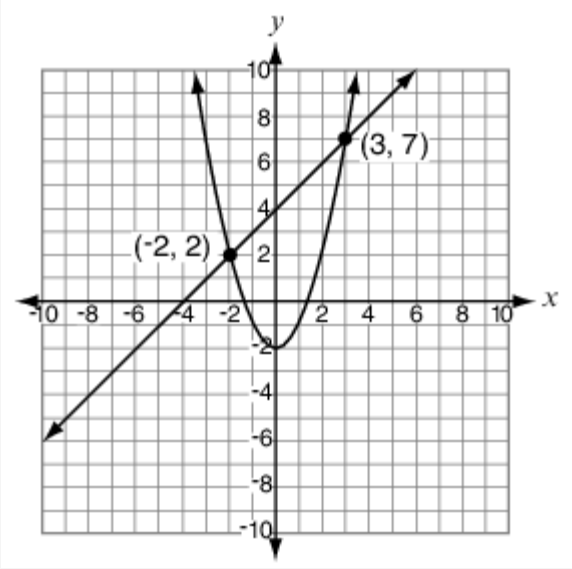
D. There are infinitely many real solutions to the system.

90. Which graph shows the solutions of the system of equations $y = x^2 + 2$ and $y = x + 4$?

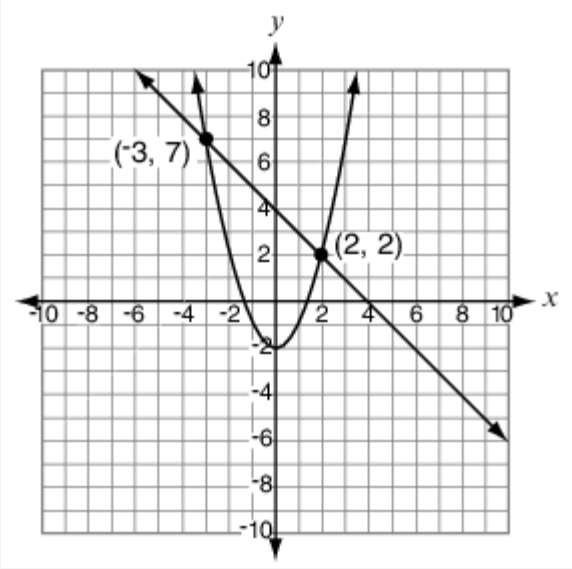
A.



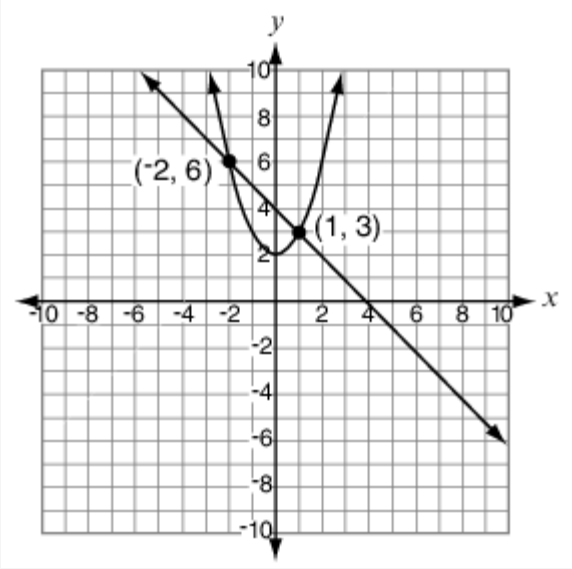
B.



C.



D.



91. Which expression is equivalent to $a^2 + 2a - 8$?

A. $(a + 2)(a - 4)$

B. $(a + 4)(a - 2)$

C. $(a + 1)(a - 8)$

D. $(a - 1)(a + 8)$

92. Which expression is equivalent to $2x^2 - 18x + 28$?

A. $(2x - 7)(x - 4)$

B. $(2x + 7)(x - 4)$

C. $2(x - 7)(x - 2)$

D. $2(x + 7)(x - 2)$

93. Which equation is equivalent to the piecewise function shown below?

$$y = \begin{cases} -2x, & x \le 1 \\ 2x - 4, & x > 1 \end{cases}$$

A. $y = 2|x - 2| - 1$

B. $y = 2|x + 1| - 2$

C. $y = 2|x - 1| - 2$

D. $y = 2|x + 2| - 1$

94. Which property can be used to justify rewriting the equation $6x - 4 + 3x^2 = 0$ in the form $3x^2 + 6x - 4 = 0$?

A. Commutative Property

B. Associative Property

C. Identity Property

D. Distributive Property

95. Which expression is equivalent to

$\frac{8x^9}{2x^3}$?

A. $4x^3$

B. $4x^6$

C. $6x^3$

D. $6x^6$

96. Which expression is equivalent to $(x^5y)^2$?

A. x^5y^2

B. x^7y^2

C. x^7y^3

D. $x^{10}y^2$

97. Which expression is equivalent to $4x^2 - 121$?

A. $(2x - 11)(2x - 11)$

B. $(2x - 11)(2x + 11)$

C. $(4x - 11)(x - 11)$

D. $(4x - 11)(x + 11)$

98. Which expression is equivalent to $4x^2 + 12xy + 9y^2$?

A. $(2x + 3y)^2$

B. $(4x + 9y)^2$

C. $(2x)^2 + (3y)^2$

D. $(4x)^2 + (9y)^2$

99. Which expression is equivalent to $\left(x^2y^3\right)^2$?

A. x^4y^6

B. x^4y^5

C. x^4y^3

D. x^2y^6

100. Which expression is equivalent to $2x\left(y^2 + 3\right) - 5\left(3 + y^2\right)$?

A. $2x\left(3y^2\right)-5\left(3y^2\right)$

B. $\left(2x-5\right)\left(3+y^2\right)$

C. $\left(2x+3\right)-\left(5+y^2\right)$

D. $\left(2x+5\right)\left(y^2+3\right)$

101. For all values of b EXCEPT 0 and 1, what does $b^6 \cdot b^3$ equal?

A. b^9

B. $(2b)^9$

C. b^{18}

D. $(2b)^{18}$

102. What are the values of a, b, and c in the equation $4(x-2)^2-7=ax^2+bx+c$?

A. $a=4;\ b=-4;\ c=-3$

B. $a=4;\ b=4;\ c=-3$

C. $a=4;\ b=16;\ c=9$

D. $a = 4;\ b = -16;\ c = 9$

103. Which expression is equivalent to $xyxyyxy$?

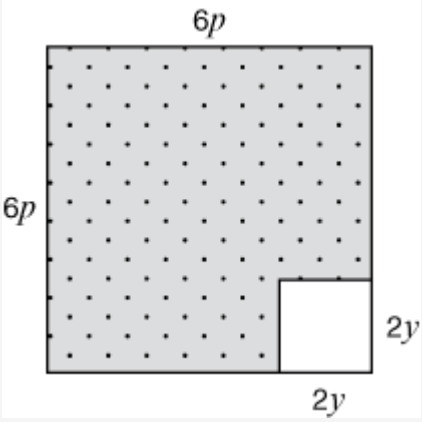
A. x^3y^4

B. x^4y^3

C. $4x^3y^3$

D. $3x4y$

104. The floor plan of a daycare center is shown below. The arts-and-crafts area in the lower right corner is NOT carpeted. The rest of the center is carpeted.



Part A. Write an expression, in factored form, for the area of the floor that is carpeted.

Part B. What would be the area of the carpeted floor, in factored form, if the arts-and-crafts area was increased to a square with an area of $9y^2$ units?

Use words, numbers, and/or pictures to show your work.

105. Which of the following points is the x-intercept of the graph of $6x - 3y = 36$?

A. $(-12, 0)$

B. $(0, -12)$

C. $(6, 0)$

D. $(0, 6)$

106. The graph of which function has neither origin nor y-axis symmetry?

A. $f(x) = |x|$

B. $f(x) = \frac{9}{x}$

C. $f(x) = 10^x$

D. $f(x) = \cos(x)$

107. The graph of which of the following equations has x-intercepts of 4 and -4?

A. $y + 4 = x$

B. $y - 4 = x$

C. $y + 16 = x^2$

D. $x + 16 = y^2$

108. What are the x- and y-intercepts for $-x + 2y = 8$?

A. $(-8, 0)$ and $(0, 4)$

B. $(4, 0)$ and $(0, 8)$

C. $(4, 0)$ and $(0, -8)$

D. $(8, 0)$ and $(0, -4)$

109. What point is the y-intercept of the line represented by the equation $6x + 8y = 48$?

A. $(8, 0)$

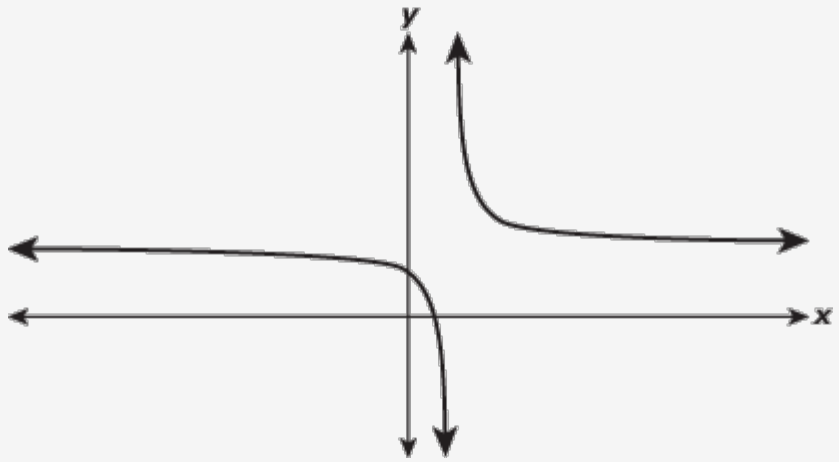
B. $(6, 0)$

C. $(0, 8)$

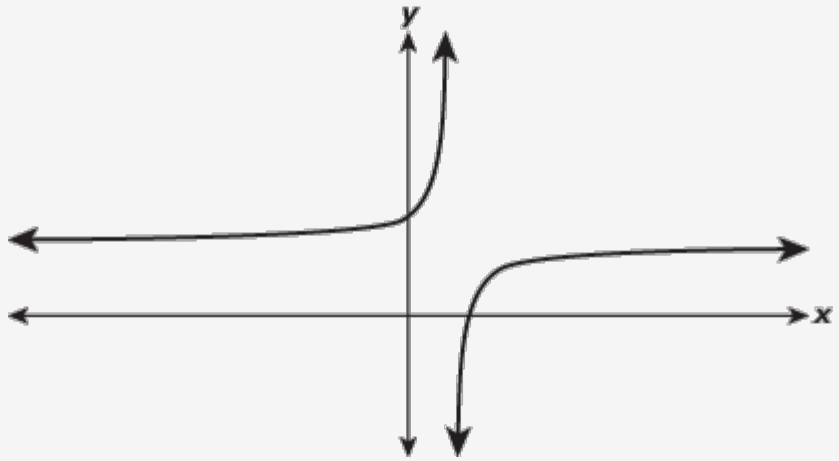
D. $(0, 6)$

110. Which rational function is decreasing in the interval $(-\infty, 1)$ and is symmetric over the line $x = 1$?

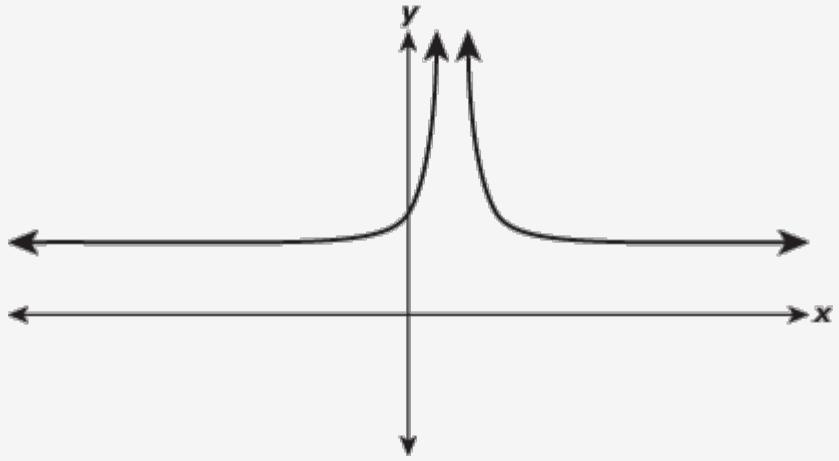
A.



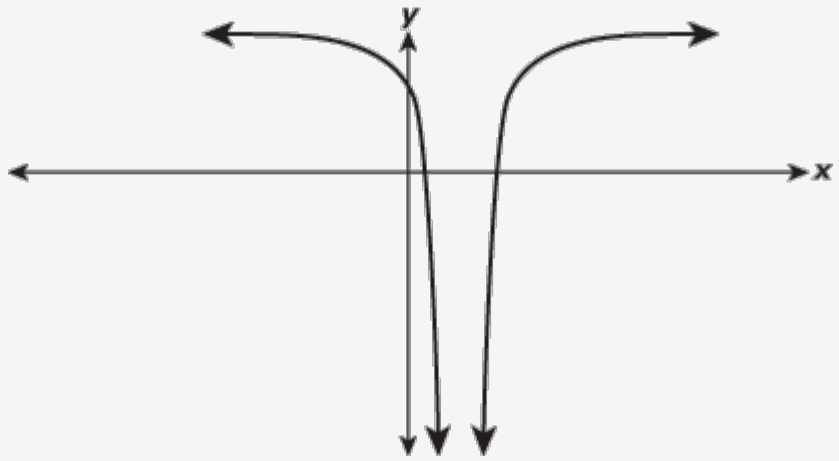
B.



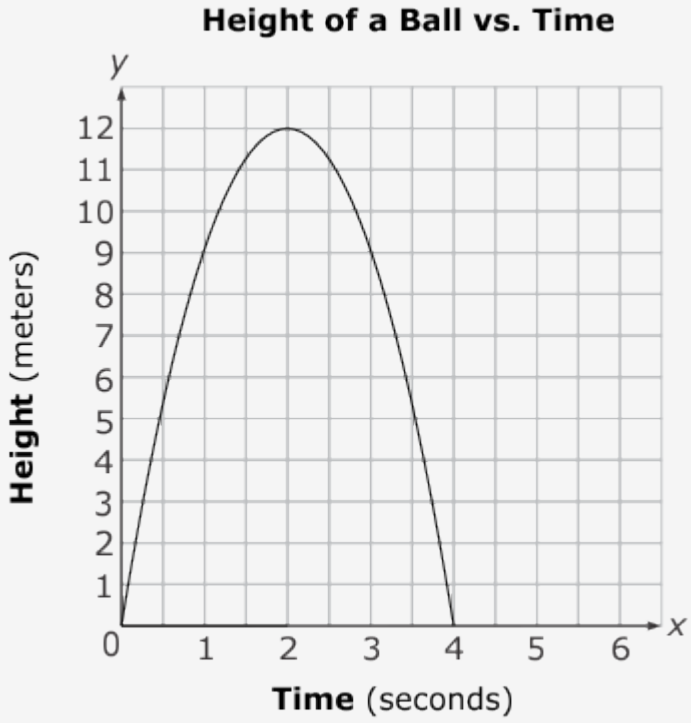
C.



D.



111. The graph below shows the relationship between the height of a ball (in meters), *y*, thrown into the air and the time (in seconds), *x*.



Which statement *best* describes the height of the ball?

A. The maximum height is 2 meters.

B. The maximum height is 4 meters.

C. The height is increasing for 2 seconds.

D. The height is increasing for 4 seconds.

112. Line l is represented by the equation $\frac{3}{2}x + \frac{5}{3}y = \frac{1}{6}$. What are the x- and y-intercepts of line l?

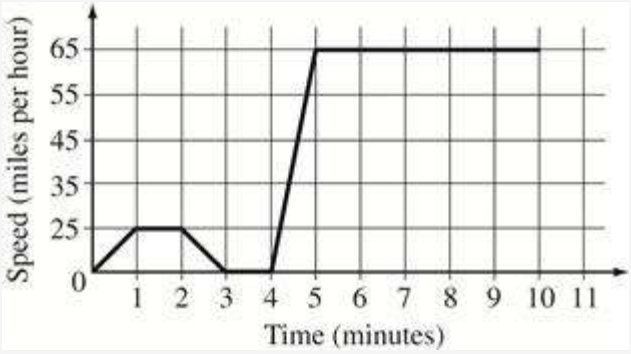
A. x-intercept of $\frac{1}{9}$ and y-intercept of $\frac{1}{10}$

B. x-intercept of $\frac{1}{4}$ and y-intercept of $\frac{5}{18}$

C. x-intercept of $\frac{2}{3}$ and y-intercept of $\frac{3}{5}$

D. x-intercept of $\frac{3}{2}$ and y-intercept of $\frac{5}{3}$

113. The graph below shows the speed of a car that is driven through a town and then on a major highway.



During which of the following time intervals was the car stopped at a traffic light?

A. Between 0 and 1 minute

B. Between 1 and 2 minutes

C. Between 2 and 3 minutes

D. Between 3 and 4 minutes

114. Look at the equation below.

$y = -Ax + 10$

For what value of A will the graph of the equation have an x-intercept of $\frac{10}{3}$?

A. 3

B. $\frac{10}{3}$

C. $\frac{20}{3}$

D. 10

115. What point is the x-intercept of the line represented by the equation $3x - 4y = -24$?

A. $(6, 0)$

B. $(3, 0)$

C. $(-4, 0)$

D. $(-8, 0)$

116. A rocket is launched with an initial upward velocity of 320 feet per second from an initial height of 15 feet. The function $h(t) = -16t^2 + 320t + 15$ models the height of the rocket, in feet, t seconds after it was launched. For how many seconds is the the height of the rocket greater than or equal to 1,039 feet?

A. 4 seconds

B. 12 seconds

C. 16 seconds

D. 20 seconds

117. Look at the equation below.

$y = -Ax + 9$

For which value of A will the graph of the equation have an x-intercept of $\frac{9}{2}$?

A. $-\frac{9}{2}$

B. 2

C. $\frac{9}{2}$

D. 9

118. Which point is the x-intercept of the line represented by the equation $6x + 5y = 30$?

A. (6, 0)

B. (5, 0)

C. (0, 6)

D. (0, 5)

119. The table below shows the cost for a toy company to produce different amounts of toys.

Toys Produced	Cost
1,000	$122,000
3,000	$26,000
5,000	$10,000
7,000	$74,000

Assuming a quadratic relationship, *about* how many toys should the company produce to minimize costs?

A. 1,000

B. 4,000

C. 5,000

D. 6,000

120. What are the *x*- and *y*-intercepts of the graph of $2y - \frac{1}{2}x = 10$?

A. $x\text{–intercept} = 5,\ y\text{–intercept} = -20$

B. $x\text{–intercept} = -5,\ y\text{–intercept} = 20$

C. $x\text{–intercept} = 20,\ y\text{–intercept} = -5$

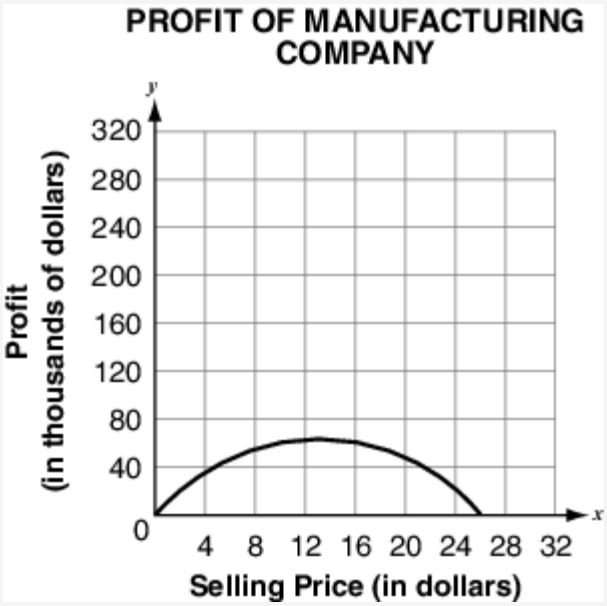
D. $x\text{–intercept} = -20,\ y\text{–intercept} = 5$

121. The total profit of a manufacturing company in thousands of dollars is modeled by the function $f(x) = -4x^2 + 144x - 1040,$ where *x* represents the selling price of each product in dollars. Which graph best represents the total profit the company earns on different selling prices of its product?

A.

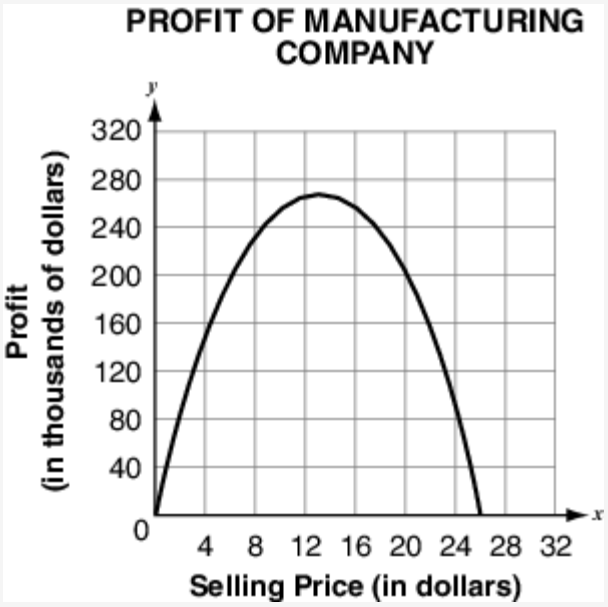

PROFIT OF MANUFACTURING COMPANY
Profit (in thousands of dollars)
y
320
280
240
200
160
120
80
40
0
x
4 8 12 16 20 24 28 32
Selling Price (in dollars)

B.

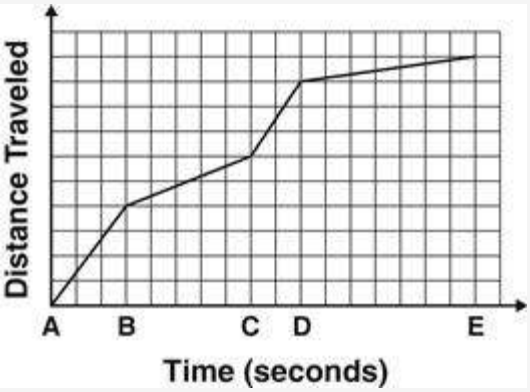

PROFIT OF MANUFACTURING COMPANY
Profit (in thousands of dollars)
y
320
280
240
200
160
120
80
40
0
x
4 8 12 16 20 24 28 32
Selling Price (in dollars)

C.

D.



122. This graph displays the distance traveled by a cart as a function of time in seconds.



At which time interval is the cart moving fastest?

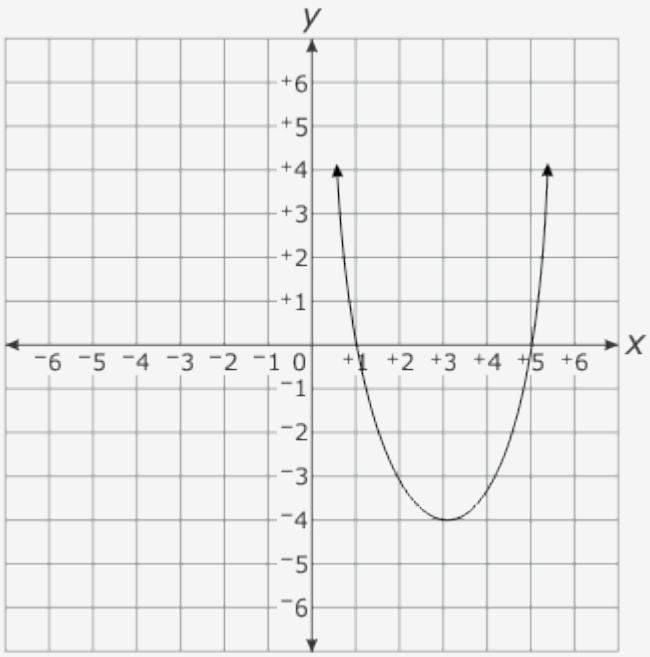
A. between A and B

B. between B and C

C. between C and D

D. between D and E

123. What is the minimum value of the function graphed below?



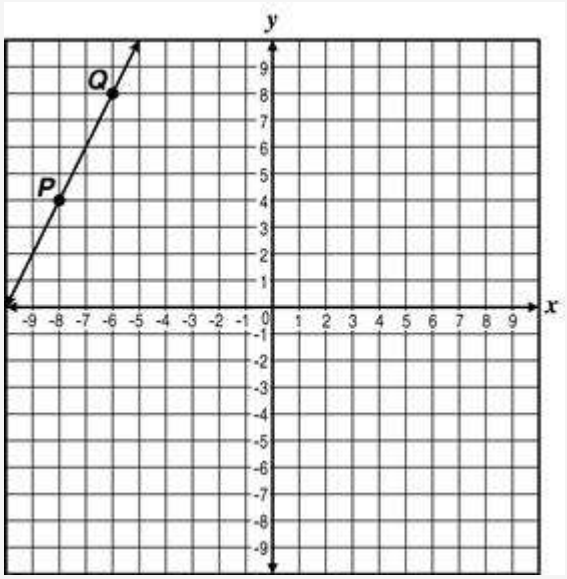
A. 5

B. 3

C. 1

D. -4

124. Points $P(-8, 4)$ and $Q(-6, 8)$ are on the line shown in the coordinate plane below.



What is the y-intercept of the line containing Points P and Q?

A. $(0, 16)$

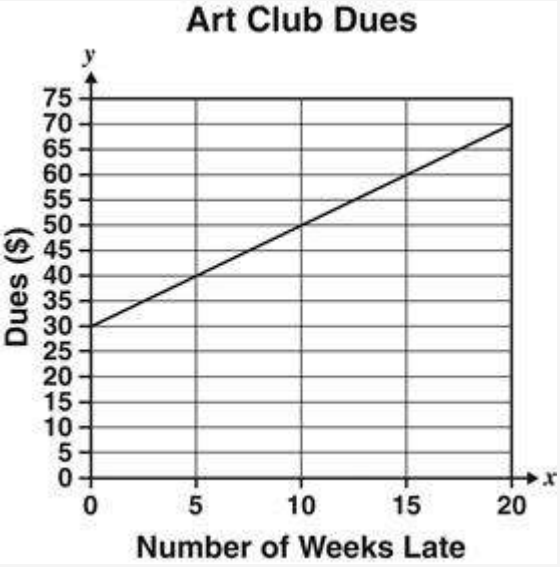
B. $(0, 20)$

C. $(0, 22)$

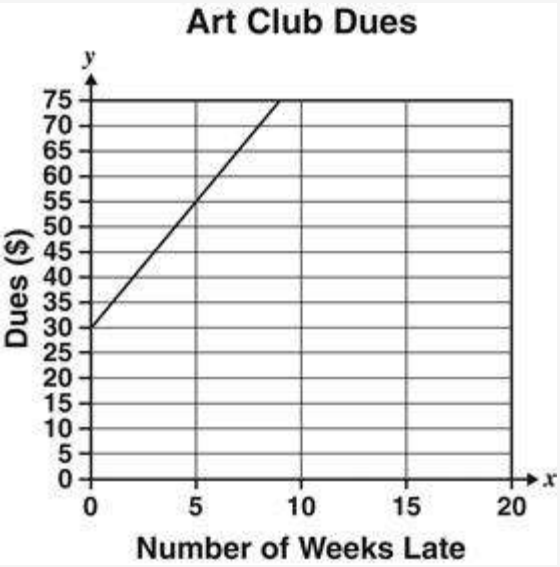
D. $(0, 24)$

125. Rafael is collecting the annual dues for the school art club. He is collecting $30 from each student who pays at the first meeting. For each week the dues are late, the fee increases by $2. Which graph, A or B, most accurately represents this situation? Explain.

Graph A:

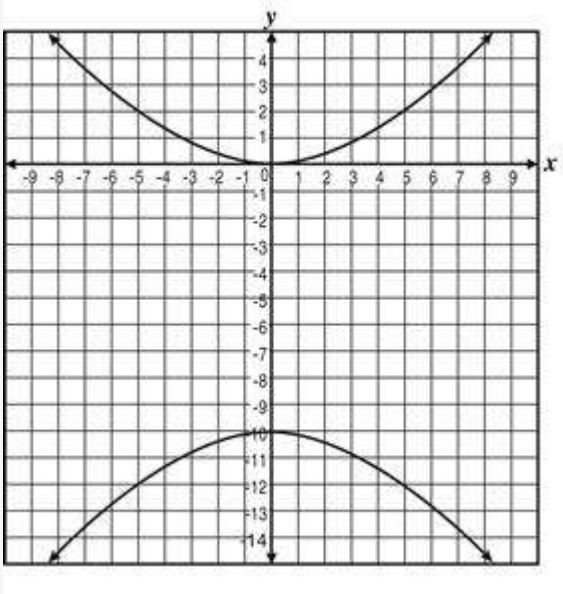


Graph B:



Describe a similar or related situation that is represented by the other graph.

126. The graph of the hyperbola $x^2 - y^2 = 10y$ is shown below.



About which line is this graph symmetric?

A. $y = 0$

B. $y = -5$

C. $y = x - 5$

D. $y = -x - 5$

127. Look at the equation.

$y = -Ax + 6$

For which value of A will the graph of the equation have an x-intercept of $\frac{3}{2}$?

A. 6

B. $\frac{9}{2}$

C. 4

D. $\frac{3}{2}$

128. What is the x-intercept of the graph of $2x - 4y = 7$?

A. -4

B. $-\frac{7}{4}$

C. $\frac{7}{2}$

D. 2

129. Look at the equation below.

$y = -Ax + 8$

For what value of A will the graph of the equation have an x-intercept of 6?

A. $-\frac{4}{3}$

B. $\frac{4}{3}$

C. 6

D. 8

130. Last year, a computer store sold 200 laptops at the price of $1,000 per laptop. The store manager is planning for the upcoming year. She creates the graph shown below of the projected revenue from the sales of laptop computers for next year depending on the price increase per laptop.

What does the vertex of the parabola represent in terms of the context?

A. The minimum revenue from laptops will be $1,000 when the price per laptop is not increased.

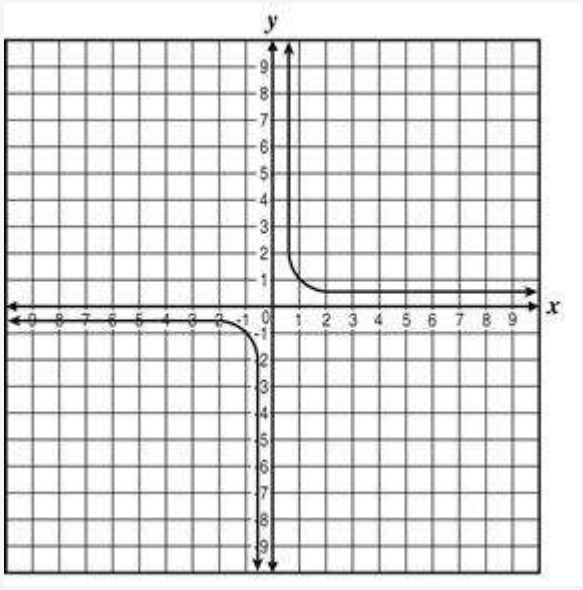
B. The minimum revenue from laptops will be $200,000 when the price per laptop is not increased.

C. The maximum revenue of $225,000 occurs when the laptops are priced at $250.

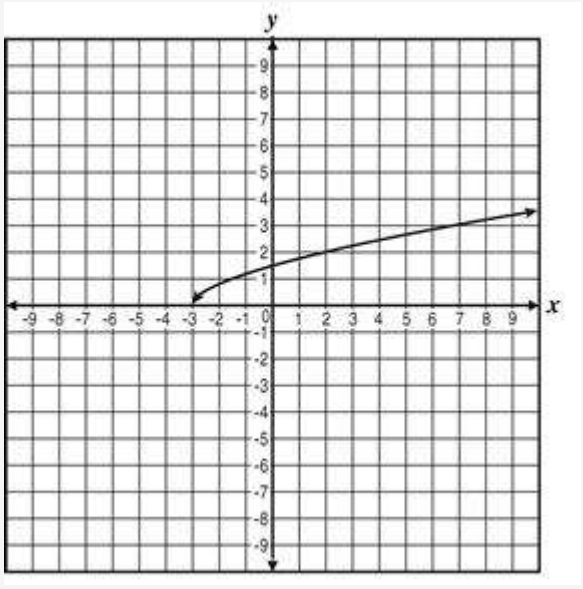
D. The maximum revenue of $225,000 occurs when the laptops are priced at $1,250.

131. Which graph is an example of a noncontinuous function?

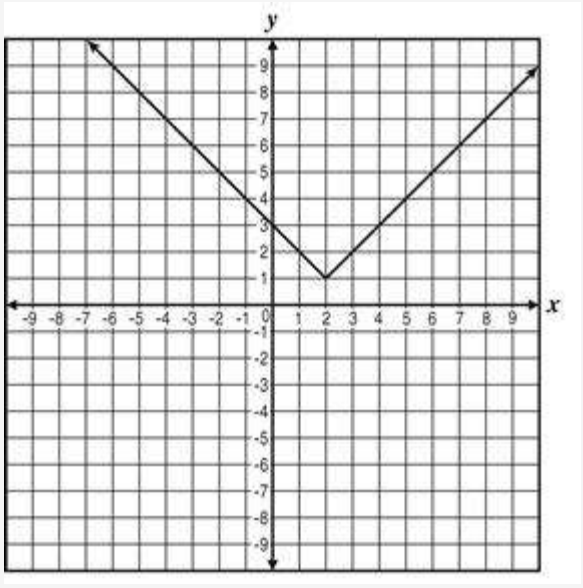
A.



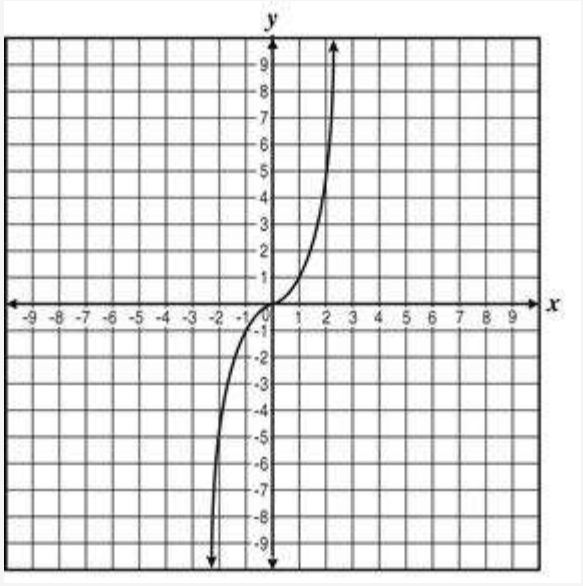
B.



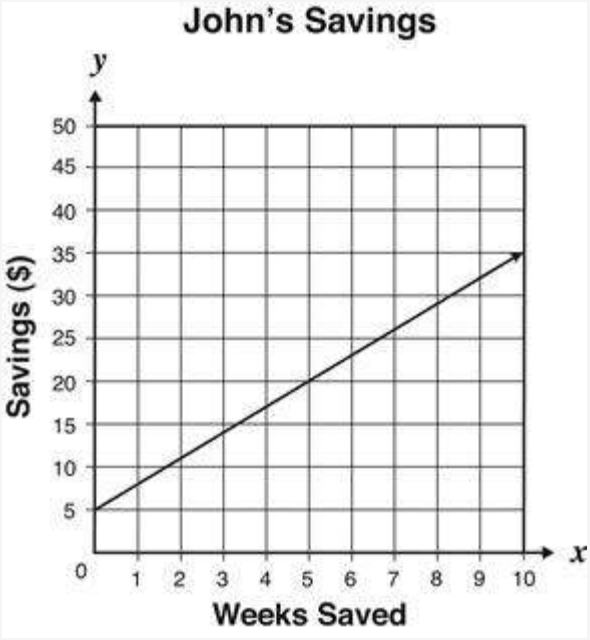
C.



D.



132. Which problem could be modeled by the graph shown below?



A. John has \$3 saved and saves \$5 more each week. How much money will he have saved after x weeks?

B. John has \$5 saved and saves \$3 more each week. How much money will he have saved after x weeks?

C. John has \$5 saved and spends \$3 each week. How much money will he have left after x weeks?

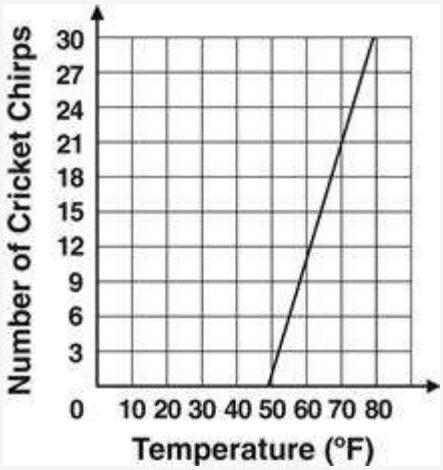
D. John has \$3 saved and spends \$5 a week. How much money will he have left after x weeks?

133. Paula counted the number of cricket chirps she heard in fifteen-second intervals at different times based on the temperature outside and recorded her results in the table.

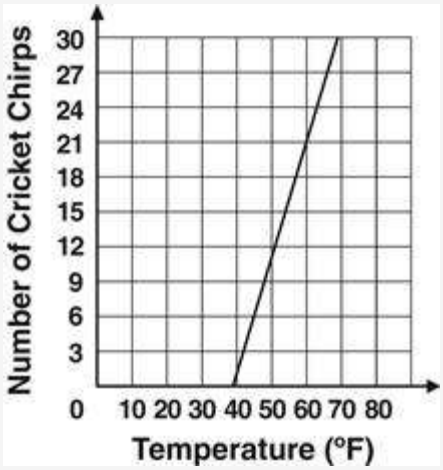
Number of Cricket Chirps	Temperature (°F)
30	69
20	59
13	52

Which graph shows the relationship between the number of cricket chirps and the outside temperature?

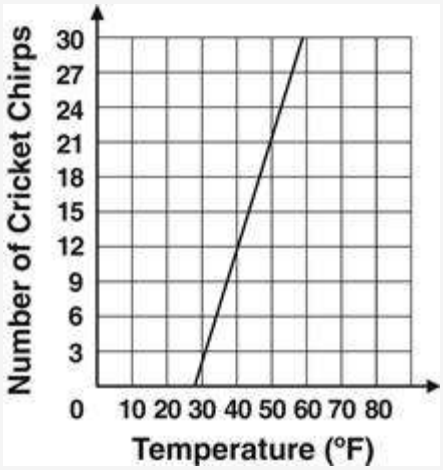
A.


Number of Cricket Chirps
30
27
24
21
18
15
12
9
6
3
0
10 20 30 40 50 60 70 80
Temperature (°F)

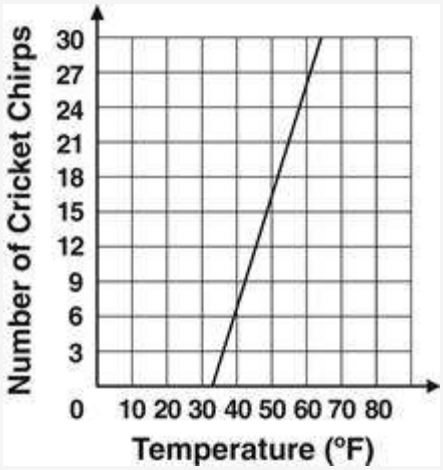
B.


Number of Cricket Chirps
30
27
24
21
18
15
12
9
6
3
0
10 20 30 40 50 60 70 80
Temperature (°F)

C.


Number of Cricket Chirps
30
27
24
21
18
15
12
9
6
3
0
10 20 30 40 50 60 70 80
Temperature (°F)

D.



134. If $y = -3(x + 2)^2 + 1$, where x is an integer, what is the greatest possible value of y?

A. –2

B. –1

C. 1

D. 2

135. A skydiver jumps from a height of 3,600 feet above the ground. The table below shows his height at different intervals of time.

CHANGE IN SKYDIVER'S HEIGHT OVER TIME

Time (in seconds)	Height above the ground (in feet)
0	3,600
2	3,536
4	3,344
6	3,024
8	2,576
10	2,000

If the skydiver's height with respect to time can be shown using a quadratic equation, how many seconds does it take the skydiver to reach the ground?

A. 15 seconds

B. 16 seconds

C. 20 seconds

D. 32 seconds

136. What point is the y-intercept of the line represented by the equation $9x + 5y = 45$?

A. $(0, 5)$

B. $(0, 9)$

C. $(5, 0)$

D. $(9, 0)$

137. Jimmy threw a baseball in the air from the roof of his house. The path followed by the baseball can be modeled by the function $f(t) = -8t^2 + 48t + 40$, where t represents the time in seconds after the ball was thrown and $f(t)$ represents its height, in feet, from the ground.

Part A. How high is the roof from the ground? How many seconds did it take for the ball to hit the ground after it was thrown off the roof?

Part B. Jimmy wanted to throw the ball at a maximum height of 120 feet. Did Jimmy's baseball reach this height after it was thrown? Explain your answer.

Use words, numbers, and/or pictures to show your work.

138. What is the x-intercept of the graph of $3x - y + 6 = 0$?

A. $(-2, 0)$

B. $(0, -6)$

C. $(0, 6)$

D. $(2, 0)$

139. Which of the following functions has rotational symmetry with respect to the origin?

A. $y = x$

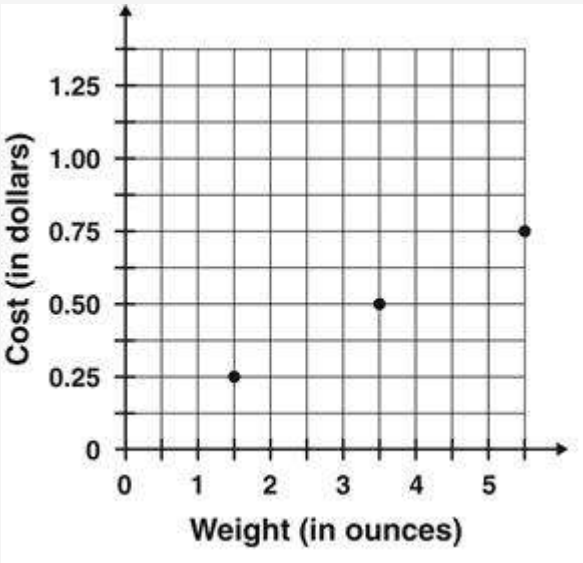
B. $y = |x|$

C. $y = x^2$

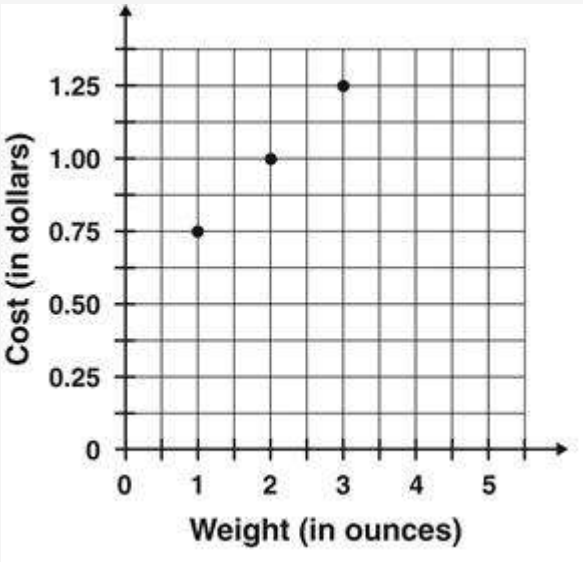
D. $y = \frac{1}{x^2}$

140. Henry purchased 3 ounces of jawbreakers for $0.75. Which graph best represents the relationships between the cost of the jawbreakers and their weight?

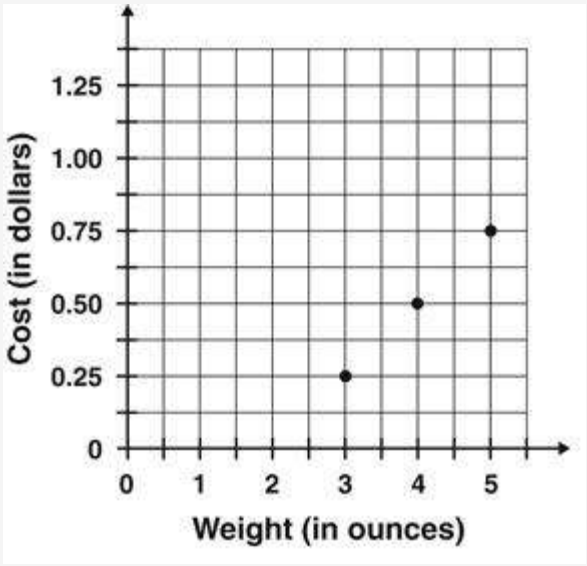
A.



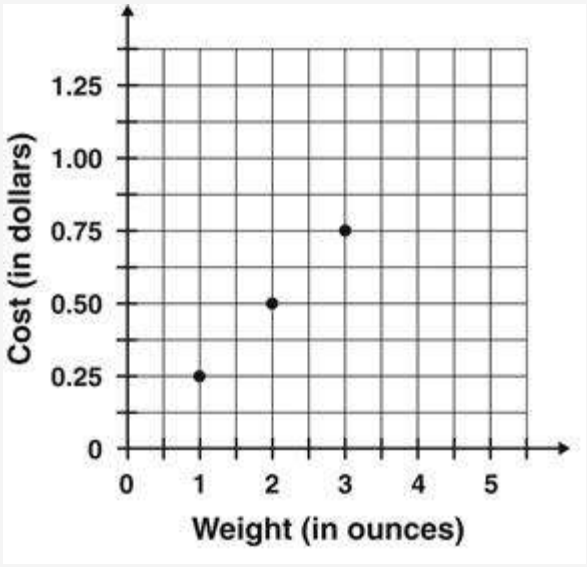
B.



C.

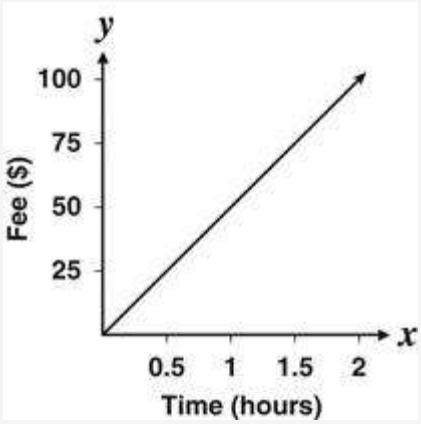


D.

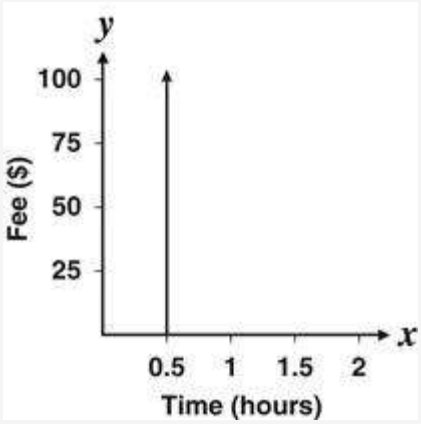


141. A piano teacher charges $25 for a half-hour lesson. Which graph represents the relationship between the time spent teaching piano and the teacher's fee?

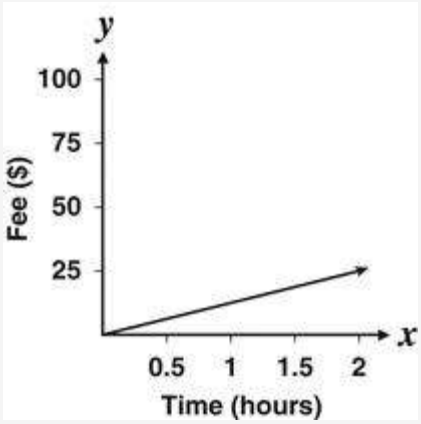
A.


y
100
75
50
25
Fee ($)
x
0.5
1
1.5
2
Time (hours)

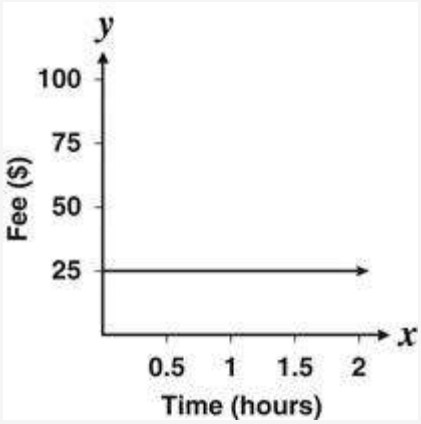
B.


y
100
75
50
25
Fee ($)
x
0.5
1
1.5
2
Time (hours)

C.

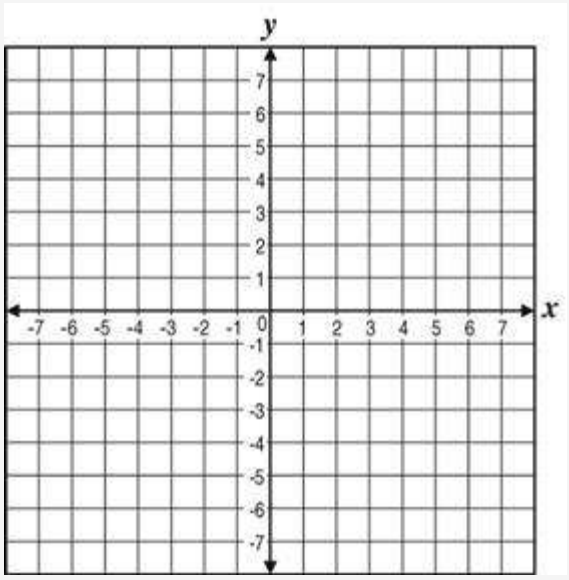

y
100
75
50
25
Fee ($)
x
0.5
1
1.5
2
Time (hours)

D.



142. • Compute algebraically the x-intercept and y-intercept of the graph of the equation $4x + 5y = 20$. Show your work.

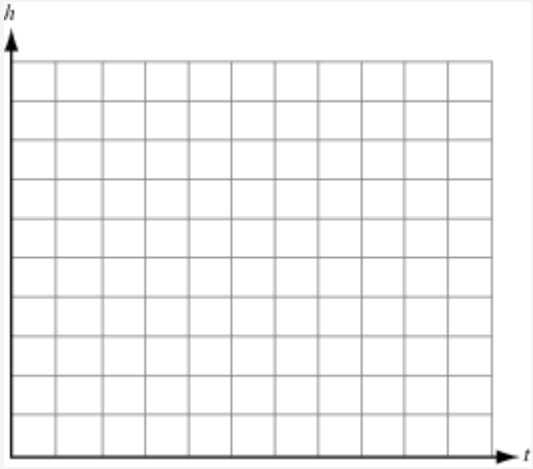
- Write the ordered pairs (x, y) for both the x-intercept and the y-intercept of the graph.
- Draw the graph of the equation $4x + 5y = 20$ on the grid below.
- Mark and label the x-intercept and the y-intercept of the graph on your drawing.



143. A soccer ball is kicked upward from the ground. The path of the soccer ball can be represented by a parabola. One second after the ball is kicked, it reaches its maximum height, 16 feet.

Part A. How many seconds after the ball has been kicked does it return to the ground? Explain.

Part B. Draw a graph representing the height, h, of the ball t seconds after it has been kicked. Label the axes and use an appropriate scale.



Use words, numbers, and/or pictures to show your work.

144. Sarah's car holds a maximum of 12 gallons of gas. The function $f(g) = 3.50g$ models the relationship between the total cost of gas, $f(g)$, and the number of gallons of gas purchased, g. What is the *most appropriate* domain of the function?

A. $g < 12$

B. $g \leq 12$

C. $0 < g < 12$

D. $0 \leq g \leq 12$

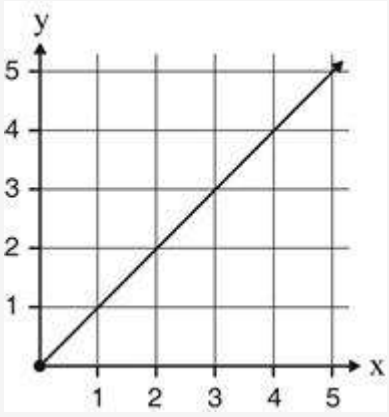
145. Jeanette writes the functions below to model two different situations.

$f(x) = 124(0.5)^x$ models the depreciated value of a video game after x months.

$h(x) = 124(0.5)^x$ models the number of teams left in a high school football tournament at the end of x number of rounds.

- Describe the domain of function $f(x)$.
- Describe the domain of function $h(x)$.
- Compare the graphs of $f(x)$ and $h(x)$.

146. Based on the graph below, which of the following describes the domain?



A. all real numbers

B. all whole numbers

C. all real numbers between 0 and 6

D. all real numbers greater than or equal to 0

147. What is the domain of the function $f(x) = \frac{2x - 2}{x + 4}$?

A. $x < -4$ or $x > -4$

B. $x < -1$ or $x > -1$

C. $x < 0$ or $x > 0$

D. $x < 1$ or $x > 1$

148. What is the domain of the following function?

$f(x) = \frac{3}{x^2} + 7$

149. A high school baseball team is having a fundraiser at a restaurant. The function $f(x) = 4x$ models the amount of money that the restaurant will donate to the team if x customers purchase dinner. The restaurant agrees to donate a maximum of $500 to the team. What is the *most appropriate* domain of the function?

A. all nonnegative integers ≤ 4

B. all nonnegative integers ≤ 125

C. all nonnegative integers ≤ 500

D. all nonnegative integers

150. The function $f(x) = 1{,}575 - 225x$ models the value of a computer x years after it was purchased. What is an appropriate domain for this function?

A. $x \geq 0$

B. $x \leq 7$

C. $0 \leq x \geq 7$

D. $0 \leq x \leq 7$

151. Tom hits a golf ball up in the air with an initial velocity of 29.5 meters per second. The height of the ball can be modeled by the equation $h = -4.9t^2 + 29.5t$, where h is the height of the ball, in meters, after t seconds. What is the reasonable domain for this situation?

A. $D = \{t \mid t \geq 0\}$

B. $D = \{t \mid t \leq 6\}$

C. $D = \{t \mid 0 \leq t \leq 6\}$

D. $D = \{t \mid 0 \leq t \leq 44.3\}$

152. What is the domain of the function $f(x) = \frac{x-1}{3x-5}$?

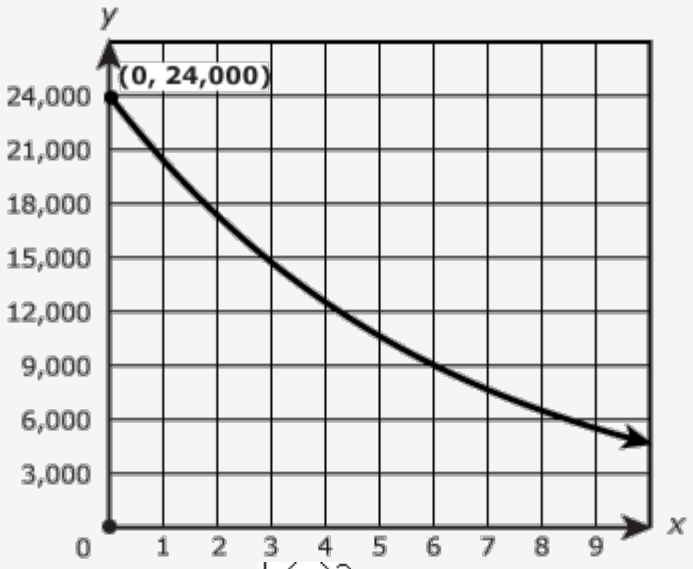
A. all real numbers except -1

B. all real numbers except $-\frac{5}{3}$

C. all real numbers except $\frac{5}{3}$

D. all real numbers except 1

153. The graph of $h(x)$ represents the predicted value of a car over x years.



What is the domain of $h(x)$?

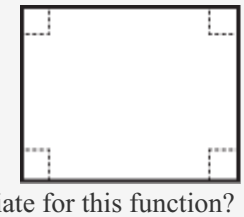
A. $\{x \mid x \geq 24,000\}$

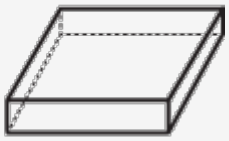
B. $\{x \mid x \geq 0\}$

C. $\{y \mid y \geq 24,000\}$

D. $\{y \mid y \geq 0\}$

154. Rene makes a box with no top out of a piece of cardboard. A square with dimensions x inches (in) is cut from each corner as shown. The volume of the box is given by the function $V(x) = x(12 - 2x)(15 - 2x)$.





Which domain is appropriate for this function?

A. all positive real numbers

B. all positive real numbers such that $0 < x < 6$

C. all positive real numbers such that $0 < x < 7.5$

D. all positive real numbers such that $0 < x < 6 \text{ or } x > 7.5$

155. A house painter can paint one wall every 30 minutes during an 8-hour shift. Which *best* describes the domain if the number of walls the painter can paint is a function of time?

A. [0, 16]

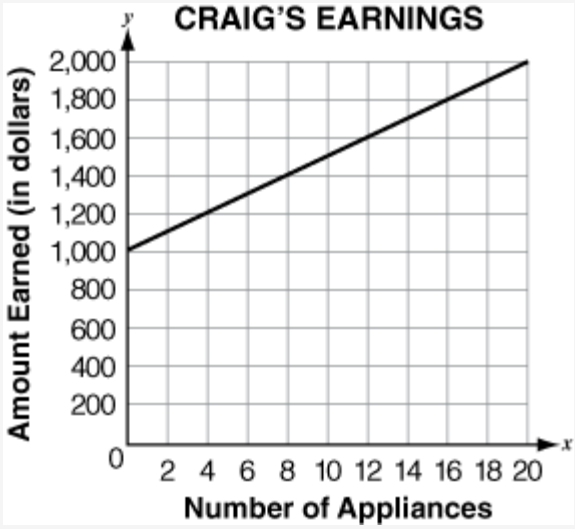
B. [0, 8]

C. {0, 1, 2, 3, 4, 5, 6, 7, 8}

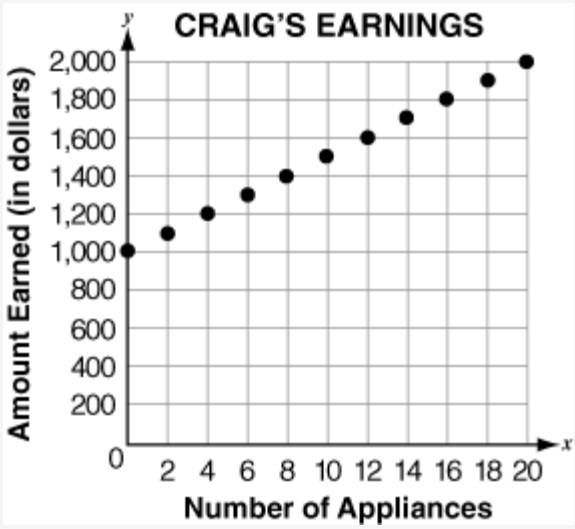
D. {0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8}

156. Craig works at an appliance store. He earns a fixed salary of $1,000 every 2 weeks. He also earns a $50 commission on each appliance he sells. Craig's earnings in dollars, *y*, can be represented as a function of the number of appliances he sells, *x*. Which graph represents Craig's earnings during a two week period in which he sells no more than 20 appliances?

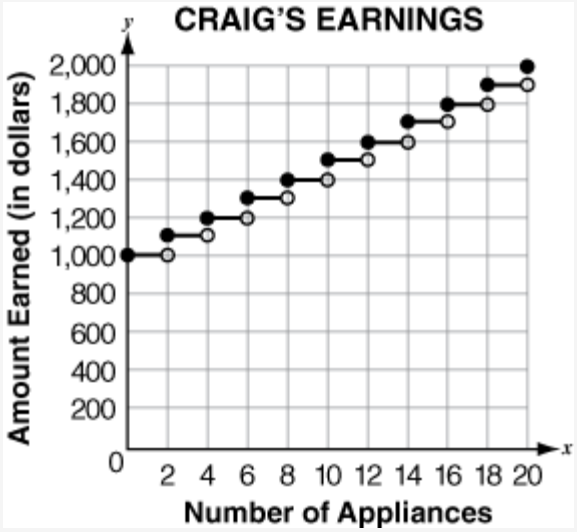
A.


CRAIG'S EARNINGS
y
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Amount Earned (in dollars)
2 4 6 8 10 12 14 16 18 20
x
Number of Appliances

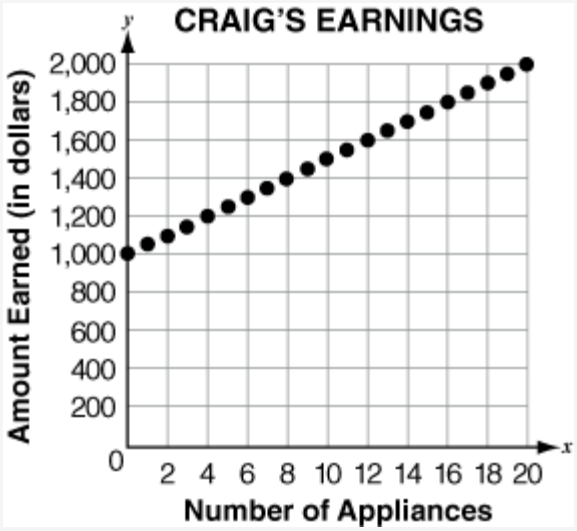
B.


CRAIG'S EARNINGS
y
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Amount Earned (in dollars)
2 4 6 8 10 12 14 16 18 20
x
Number of Appliances

C.



D.



157. The total cost for potatoes, y, at a grocery store can be modeled by the equation $y = 0.59x$, where x is the number of pound of potatoes. What is the *most appropriate* domain of the function?

A. all nonnegative rational numbers

B. all nonnegative integers

C. all rational numbers

D. all integers

158. Felix throws a ball into the air. The height of the ball, h, in feet at a given time, t, in seconds is represented by the function $h(t) = -16t^2 + 24t + 16$. What is the reasonable domain for the function $h(t)$?

A. The domain is all real numbers greater than or equal to 0.

B. The domain is all real numbers from 16 to 25.

C. The domain is all real numbers from 0 to 2.

D. The domain is all real numbers.

159. The function $t = \sqrt{\frac{h}{16}}$ describes the time, t, takes for an object to fall in a vacuum from a given height, h. What is the domain of this function?

A. $t \geq 0$

B. $t \leq 0$

C. $h \geq 0$

D. $h \leq 0$

160. For what domain is the function $f(x) = \left(\frac{1}{3}\right)^x - 1$ positive?

A. all positive real numbers

B. all negative real numbers

C. all positive integers

D. all negative integers

161. The table below shows the population of a state during different years.

Year (x)	Population (y)
2004	8,500,000
2006	8,900,000
2007	9,000,000
2008	9,200,000
2010	9,500,000

What is the *approximate* relative domain of the line of best fit for the data?

A. $x > 0$

B. $x > 1650$

C. $x > 1952$

D. $x > 2004$

162. A rental company uses the function $f(x) = 150x + 75$ to calculate the cost to rent a beach house x number of nights. The maximum number of nights the beach house can be rented is 30. What is the domain of the function?

A. $0 \leq x \leq 30$, where x is a whole number

B. $0 < x < 30$, where x is a whole number

C. $0 \leq x \leq 4{,}575$, where x is a whole number

D. $0 < x < 4{,}575$, where x is a whole number

163. Which set describes the domain of $y = \sqrt{5x - 6}$?

A. $\{x \mid x \geq 6\}$

B. $\left\{x \mid x \geq \frac{6}{5}\right\}$

C. $\{x \mid x \leq 6\}$

D. $\left\{x \mid x \leq \frac{6}{5}\right\}$

164. An ice cream shop uses the function $f(p) = 2.50p - 300$ to calculate the amount of profit or loss, $f(p)$, the store makes each day after selling p number of ice cream cones. Which domain is appropriate for the function and shows the ice cream shop making a profit?

A. all positive integers

B. all positive rational numbers

C. all integers greater than 120

D. all rational numbers greater than 120

165. Which describes the domain of $y = \sqrt{9x - 7}$?

A. $x \geq 7$

B. $x \geq \frac{7}{9}$

C. $x \leq 7$

D. $x \leq \frac{7}{9}$

166. What is the domain of the function $f(x) = \frac{x+5}{2x+3}$?

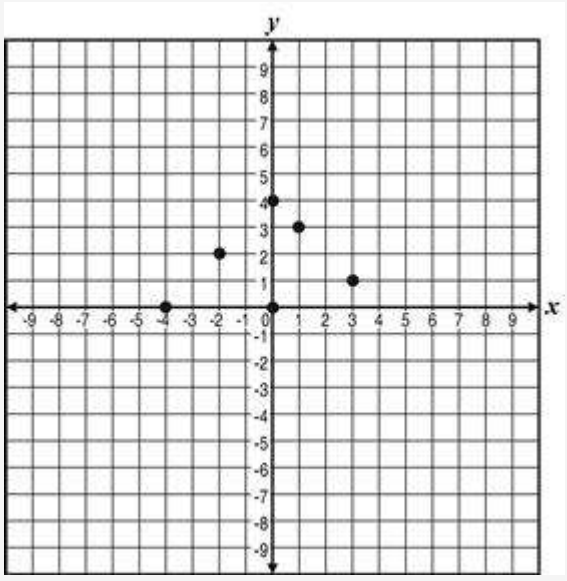
A. all real numbers except -5

B. all real numbers except $-\frac{3}{2}$

C. all real numbers except $\frac{3}{2}$

D. all real numbers except 5

167. Which of the following represents the domain for the graph below?



A. $\{0, 1, 2, 3, 4\}$

B. $\{x \geq 0\}$

C. $\{-4 \leq x \leq 3\}$

D. $\{-4, -2, 0, 1, 3\}$

168. Martin modeled the distance, *y*, that runners traveled during a race as a function of the time, *x*, that they ran. Which would *best* describe the domain of this function?

A. all integers

B. all real numbers

C. all positive integers

D. all positive real numbers

169. What is the domain of the function $f(x) = \frac{x+3}{2x-5}$?

A. All real numbers except -3

B. All real numbers except $-\frac{5}{2}$

C. All real numbers except $\frac{5}{2}$

D. All real numbers except 3

170. Which inequality describes the domain of the equation $y = \sqrt{2x-7}$?

A. $x \geq 7$

B. $x \geq \frac{7}{2}$

C. $x \leq 7$

D. $x \leq \frac{7}{2}$

171. What is the domain of the function $f(x) = \frac{x+4}{2x+7}$?

A. all real numbers except -4

B. all real numbers except $-\frac{7}{2}$

C. all real numbers except $\frac{7}{2}$

D. all real numbers except 4

172. The function $f(x) = 105x + 12.95$ models the total cost to purchase x airplane tickets from a company. What is the *most appropriate* domain of the function?

A. all non-negative real numbers

B. all non-negative integers

C. all real numbers

D. all integers

173. The function $h(t) = 1{,}000(0.95)^t$ models the size of a mold culture t hours after being treated. What is the *most appropriate* domain for this function?

A. all integers

B. positive integers

C. all rational numbers

D. positive rational numbers

174. What is the number of x-intercepts of the graph of the function $f(x) = 25x^2 + 4$?

A. 0

B. 1

C. 2

D. 4

175. The function $P(x) = -3x^2 + 48x + 174$ represents the profit, in thousands of

dollars, of a company when selling x units (in thousands) per month.

Part A. Use the process of completing the square to transform the function $P(x)$ to the form $P(x) = (x - h)^2 + k$.

Part B. What is the axis of symmetry? Explain what this tells you regarding the company's monthly profit.

Part C. What is the vertex? Explain what this tells you regarding the company's monthly profit.

Part D. What are the zeros of $P(x)$? Explain what the zeros tell you regarding the company's monthly profit.

Use words, numbers, and/or pictures to show your work.

176. A ball was kicked straight up into the air from at a velocity of 80 feet per second. The function $h(t) = -16t^2 + 80t$ models the height of the ball t seconds after it was kicked. For how many seconds is the ball descending?

A. 2.0 seconds

B. 2.5 seconds

C. 3.5 seconds

D. 5.0 seconds

177. Hampton Furniture produces couches in its factory. The quadratic function, $p(n) = -15n^2 + 615n - 600$, can be used to

determine the company's weekly profit where n is the number of couches made. What is the largest number of couches the factory can produce in 1 week and still make a profit?

A. 20

B. 21

C. 39

D. 40

178. What is the number of x-intercepts of the graph of the function $f(x) = 16x^2 + 25$?

A. 0

B. 1

C. 2

D. 3

179. James kicked a ball off the ground into the air. The function $h(t) = -16t^2 + 40t$ models the height (in feet) of the ball t seconds after it was kicked. How long did it take the ball to hit the ground after being kicked?

A. 1.25 seconds

B. 2.5 seconds

C. 4 seconds

D. 10 seconds

180. If $a > 0$, how many x-intercepts does the graph of $y = ax^2 + 3$ have?

A. None

B. One

C. Two

D. More than two

181. Jason kicked a ball into the air. The function $h(t) = 80t - 16t^2$ models the height of the ball, in feet, t seconds after it was kicked. How long does it take the ball to hit the ground?

A. 2.5 seconds

B. 5 seconds

C. 8.5 seconds

D. 10 seconds

182. Which of the following functions describes a graph that will intersect the x-axis in exactly one point?

A. $y = x^2 - 4x$

B. $y = x^2 + 4x$

C. $y = x^2 + 6x - 9$

D. $y = x^2 + 6x + 9$

183. For how many values of x does the graph of $f(x) = x^2 - 3$ intersect the x-axis?

A. 0

B. 1

C. 2

D. 3

184. How many times does the graph of the quadratic function $f(x) = x^2 - 9$ intersect the x-axis?

A. 0

B. 1

C. 2

D. 3

185. An object is launched directly upward from a platform. The height, in feet, of the object is defined by $f(x) = -16x^2 + 64x + 80$, where x represents the time in seconds after the object was launched.

Part A. Factor the given function to find the x-intercepts and interpret them in terms of the given context.

Part B. Write the given equation in vertex form.

Part C. What does the vertex represent in terms of the context?

Use words, numbers, and/or pictures to show your work.

186. Two rockets were launched from a rooftop. The heights of the rockets x seconds after being launched are modeled by the functions shown below.

Rocket F: $f(x) = -4x^2 + 29x + 24$
Rocket G: $g(x) = -5x^2 + 26x + 24$

Which statement is true?

A. Rocket F hit the ground 2 seconds after Rocket G.

B. Rocket F hit the ground 2 seconds before Rocket G.

C. Rocket F hit the ground 3 seconds after Rocket G.

D. Rocket F hit the ground 3 seconds before Rocket G.

187. What is the number of x-intercepts of the graph of the function $f(x) = x^2 + 2x + 4$?

A. 0

B. 1

C. 2

D. 4

188. Jenny used the expression $-16x^2 + 38x + 5$ to determine the height of an object x seconds after it was hit into the air. How long does it take the object to hit the ground?

A. $\frac{1}{8}$ second

B. $\frac{2}{5}$ second

C. 2.5 seconds

D. 8 seconds

189. A diver follows a path represented by the function $f(x) = x^2 - 7x + 10$, where

$f(x)$ is the vertical distance, in meters, above or below the surface of the water and x is the horizontal distance away from the diving board in meters. When the diver breaks the surface of the water, how many meters away from the diving board will the diver be?

190. Suppose the equation $h(t) = -t^2 + 5t + 14$ models the height of a ball thrown into the air off the bleachers. Which statement about the flight of the ball is true?

A. The ball starts from a height of 19 feet.

B. The ball takes 5 seconds before it hits the ground.

C. The ball takes 14 seconds before it hits the ground.

D. The ball reaches a maximum height of 20.25 feet.

191. How many times does the graph of the quadratic function $f(x) = x^2 + 1$ intersect the x-axis?

A. 3

B. 2

C. 1

D. 0

192. The factors of a quadratic function are $2x-3$ and $x-3$. What is the axis of symmetry of this function?

A. $x=\frac{9}{4}$

B. $x=\frac{9}{2}$

C. $x=-\frac{9}{2}$

D. $x=-\frac{9}{4}$

193. What is the number of x-intercepts of the graph of the function $y=x^2+11x+28$?

A. 0

B. 1

C. 2

D. 4

194. Maria compared the slope of the function $f(x)=\frac{-1}{3}(-6x-21)$ to the slope of the linear function that fits the values in the table below.

x	-4	-2	0	2	4

$g(x)$	9	8	7	6	5

Which *best* describes the slopes of the two functions?

A. Both functions have a positive slope.

B. Both functions have a negative slope.

C. Function $f(x)$ has a positive slope, while function $g(x)$ has a negative slope.

D. Function $f(x)$ has a negative slope, while function $g(x)$ has a positive slope.

195. Function $p(x)$ is defined by the equation $p(x) = x^2 - 6x + 5.$ Quadratic function $q(x)$ intersects the x-axis at -4 and 2 and passes through the point $(-3, -15).$ How does the value of the minimum for each function compare?

A. Function $p(x)$ has a minimum of $5,$ and function $q(x)$ has a minimum of $-15.$

B. Function $p(x)$ has a minimum of $-4,$ and function $q(x)$ has a minimum of $-27.$

C. Function $p(x)$ has a minimum of -4, and function $q(x)$ has a minimum of -24.

D. Function $p(x)$ has a minimum of 14, and function $q(x)$ has a minimum of -27.

196. Joseph compared the function $f(x) = 3x^2 + 2x - 1$ to the quadratic function that fits the values shown in the table below.

x	$g(x)$
0	-1
1	8
2	23
3	44
4	71

Which statement is true about the two functions?

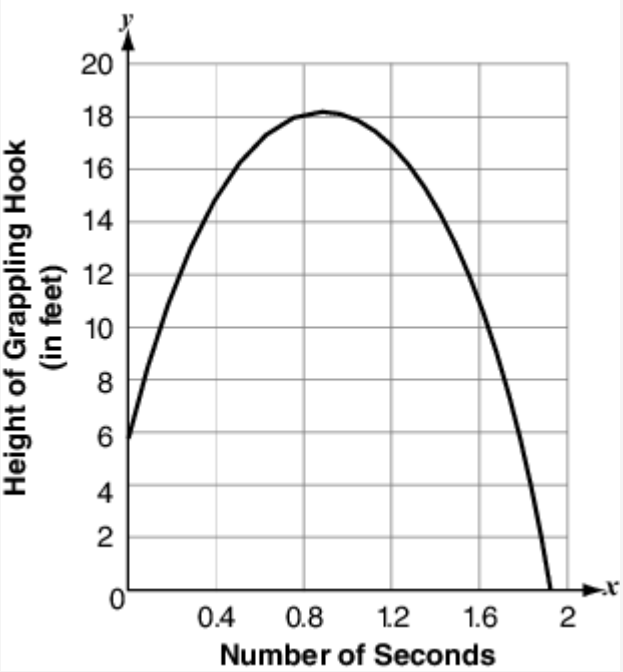
A. The functions have the same y-intercepts.

B. The functions have the same x-intercepts.

C. The functions have the same vertex.

D. The functions have the same axis of symmetry.

197. Austin and Janda threw grappling hooks into the air. The function $f(x) = -16x^2 + 32x + 5$ gives the height, in feet, of Austin's hook x seconds after he threw it. The graph below shows the height, in feet, of Janda's hook x seconds after she threw it.



If both of them threw the grappling hooks at the same time, which of these statements is **true**?

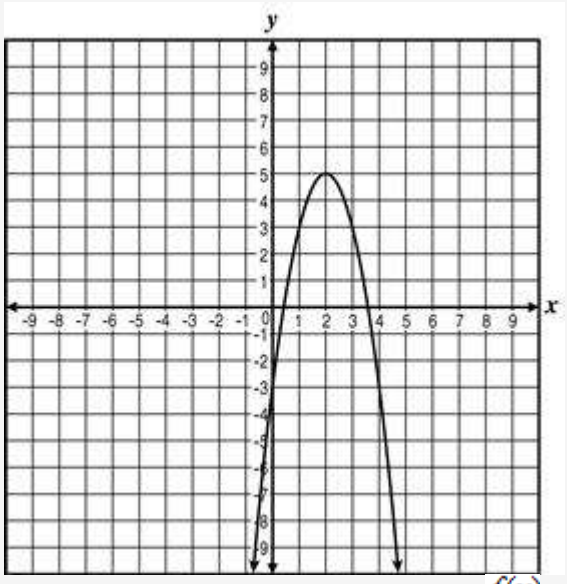
A. Austin's hook hit the ground first.

B. Austin's hook reached its maximum height first.

C. Austin's hook reached a greater maximum height.

D. Austin threw the hook from a greater initial height.

198. A function, $f(x)$, is defined by the equation $f(x) = 2(x-2)^2 + 5$. Another function, $h(x)$, is graphed below.



Which statement describing both graphs of $f(x)$ and $h(x)$ is true?

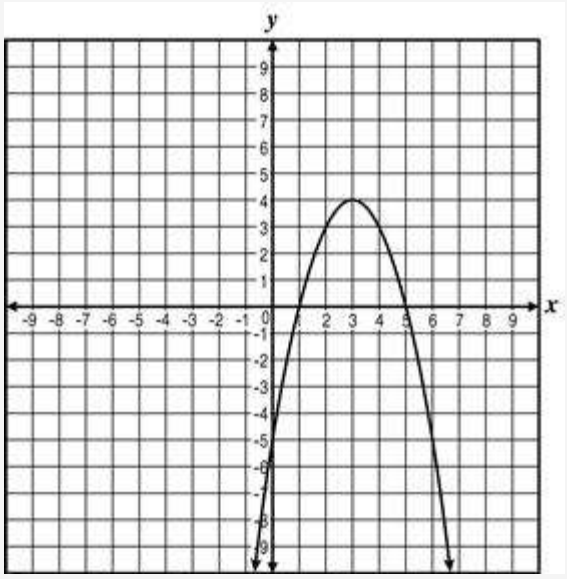
A. The parabolas open downward.

B. The parabolas have the same vertices.

C. The parabolas have the same *y*-intercept.

D. The parabolas have the same maximum value.

199. The function $g(x)$ is graphed below.



The graph of which function has the same vertex as $g(x)$?

A. $q(x) = x^2 - 5$

B. $h(x) = (x - 3)^2 + 4$

C. $p(x) = (x + 3)^2 + 4$

D. $f(x) = (x - 5)^2 + 1$

200. A quadratic function $f(x)$ intersects the x-axis at $x = 1$ and $x = 5$ and has a y-intercept of 10. Another function is represented by $g(x) = 2x^2 - 12x + 9$.

Part A. Which function has a minimum value of $y = -p$, where p represents the y-intercept of the function? Show your work.

Part B. What are the axes of symmetry of $f(x)$ and $g(x)$ and how do they compare? Explain your answer.

Use words, numbers, and/or pictures to show your work.

201. One function, $f(x)$, is defined as $f(x) = (x + 4)^2 - 3$. A second function, $g(x)$, is a parabola that passes through the points shown in the table.

x	0	1	2	3	4	5
$g(x)$	4	3	4	7	12	19

What is the absolute value of the difference of the y-intercepts of $f(x)$ and $g(x)$?

A. 6

B. 9

C. 13

D. 15

202. Allison compared the y-intercept of $f(x) = 4 - 5x$ to the y-intercept of the function that fits the values in the table below.

x	$g(x)$
0	8
1	13
2	18
3	23

Which statement is true?

A. The y-intercept of $g(x)$ is half the y-intercept of $f(x)$.

B. The y-intercept of $g(x)$ is two times the y-intercept of $f(x)$.

C. The y-intercept of $g(x)$ is equal to the y-intercept of $f(x)$.

D. The y-intercept of $g(x)$ is the negative value of the y-intercept of $f(x)$.

203. Which statement best describes the data in the table?

x	y
-1	-7
0	-5
3	1
5	5

A. The value of y is 6 less than the value of x.

B. The value of y is 2 less than the value of x.

C. The value of y is 5 less than twice the value of x.

D. The value of y is 8 less than three times the value of x.