

Name: _____

Date: _____

1. The graph of the function $f(x) = |x|$ is reflected across the line $y = 1$. Which function describes the graph after the reflection?

A. $f(x) = -|x - 2|$

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

C. $f(x) = -|x| + 2$

D. $f(x) = |x| + 2$

2. This piecewise function is equivalent to an absolute value function.

$$f(x) = \begin{cases} -x - 15, & \text{if } x \leq k \\ x + 9, & \text{if } x > k \end{cases}$$

What is the value of k ?

A. - 12

B. - 6

C. - 3

D. - 1

3. Which equation describes the graph of a function that has the roots $x = -1$ and $x = -3$?

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

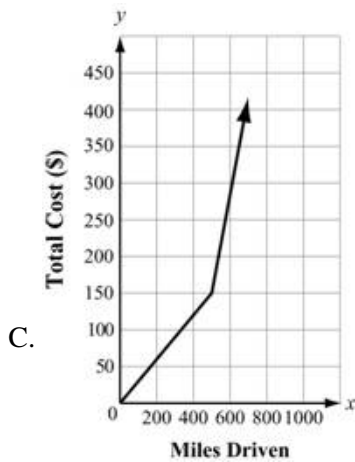
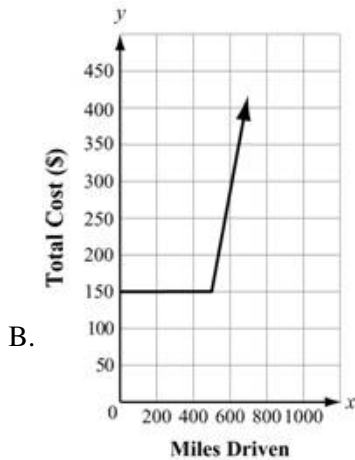
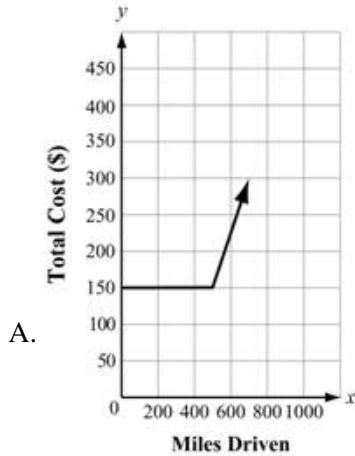
B. $f(x) = |x - 2| + 1$

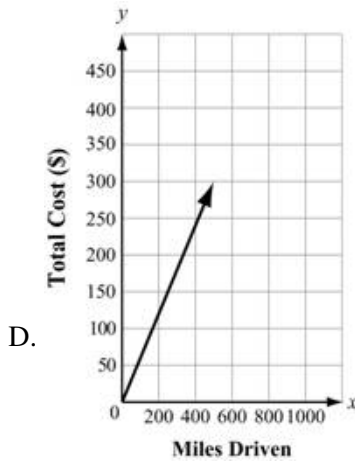
C. $f(x) = |x + 2| + 1$

D. $f(x) = |x - 2| - 1$

4. A man rents a car for 5 days at a base rate of \$30 per day. The rental agreement allows him to drive the car 500 miles. The man must pay an additional \$0.75 for each mile he drives more than 500 miles.

Which graph shows the total amount the man must pay to rent the car based on the number of miles he drives?





5. Which function describes a graph that has its vertex at the point $(2, 6)$?

- A. $f(x) = |x - 2| - 6$
 B. $f(x) = |x - 2| + 6$
 C. $f(x) = |x + 2| - 6$
 D. $f(x) = |x + 2| + 6$

6.

Use this information to answer the question.

The equation $V(t) = A(1 - p)^t$ can be used to determine the value, $V(t)$, of an item after t years of depreciation. In the equation, A represents the initial value of the item and p represents the percent of decrease in the value per year.

A student bought a car for \$8000. The value of the car depreciates by 20% per year. What is the value of the car after 3 years of depreciation?

- A. \$2000
 B. \$3200
 C. \$4096
 D. \$5120
-

7. Which expression is equivalent to $\left(\frac{2}{3}\right)^{-2}$?

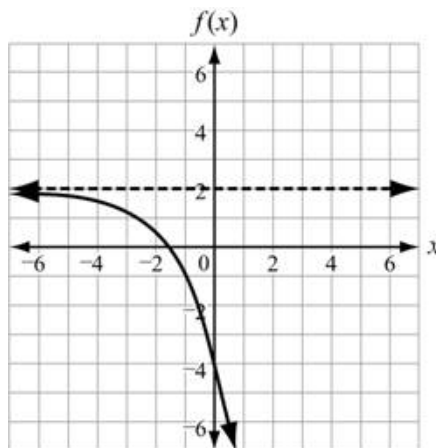
A. $-\left(\frac{3}{2}\right)^2$

B. $-\left(\frac{2}{3}\right)^2$

C. $\frac{2}{(3)^2}$

D. $\left(\frac{3}{2}\right)^2$

8. The graph of an exponential function is shown on this coordinate plane.



Which equation represents the function?

A. $f(x) = -6(2^x) + 2$

B. $f(x) = -6(2^{-x}) + 2$

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

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

9. The first 5 terms in a geometric sequence are listed.

500, 250, 125, 62.5, 31.25, ...

Which function can be used to determine the n^{th} term of the sequence?

A. $f(n) = 500 - 250(n - 1)$

B. $f(n) = 500 - \frac{1}{2}n(250)$

C. $f(n) = 500\left(-\frac{1}{2}\right)^{n-1}$

D. $f(n) = 500\left(\frac{1}{2}\right)^{n-1}$

-
10. A geometric sequence has a common ratio of 3. Which expression represents the sequence if a is a real number and n is the number of each term in the sequence?

A. $a(3^n)$

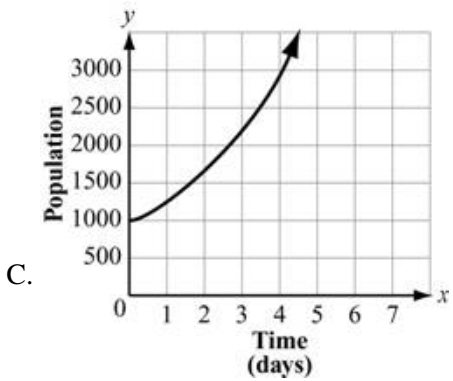
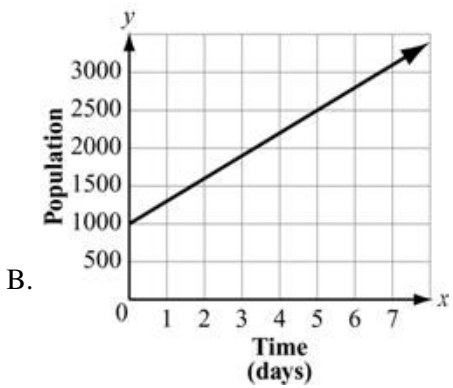
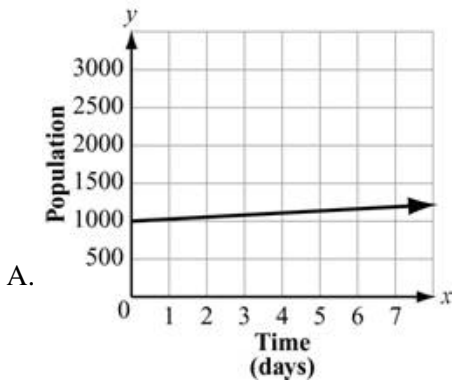
B. $3(a^n)$

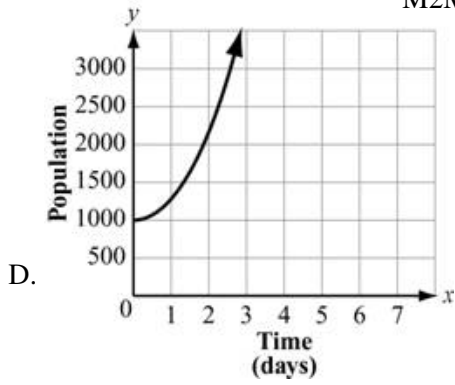
C. $a(n^3)$

D. $n(3^a)$

11. A colony of bacteria is increasing at a rate of 30% per day. The colony began with a population of 1000.

Which graph best models the population growth of the colony of bacteria?





12. What is the solution for the equation $9^{2x} = \left(\frac{1}{81}\right)^{3+x}$?

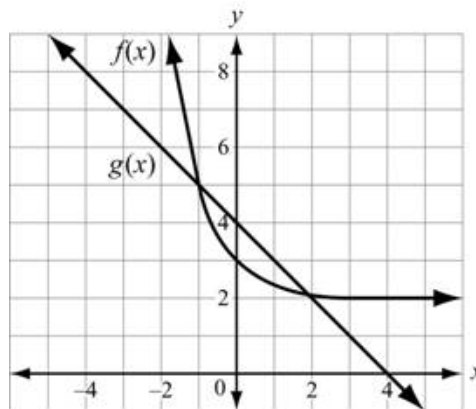
A. $-\frac{2}{3}$

B. $-\frac{3}{2}$

C. 3

D. 6

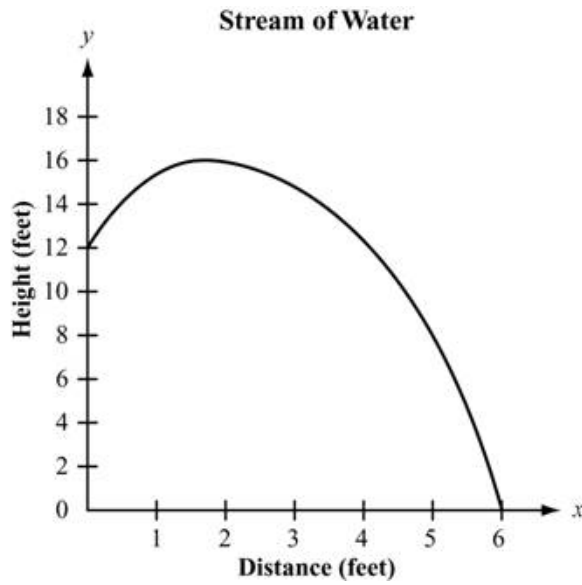
13. Two functions are graphed on this coordinate plane.



For what values of x does it appear that $f(x)$ is greater than $g(x)$?

- A. $-1 < x < 1.9$
B. $2 < x < 5$
C. $x < -1$ or $x > 1.9$
D. $x < 2$ or $x > 5$
-

14. At a water park, a stream of water is shot into the air from the top of a pole that is 12 feet tall. The function graphed on this coordinate grid represents the path of the stream of water from the top of the pole to the ground.

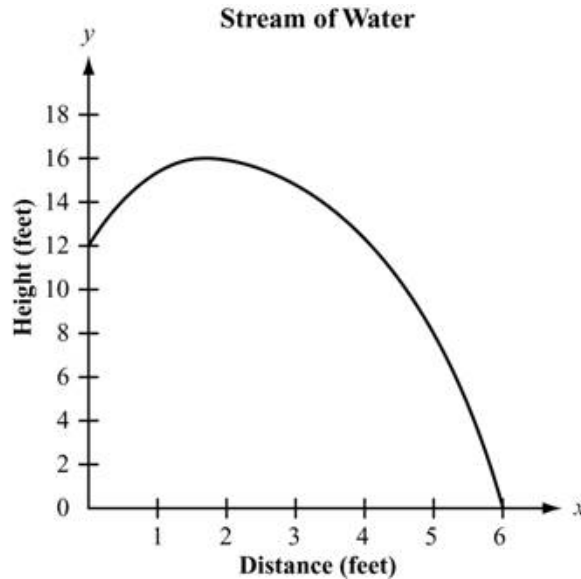


What is the domain of the function that represents the path of the stream of water from the top of the pole to the ground?

- A. - 2 to 6
 - B. - 2 to 16
 - C. 0 to 6
 - D. 0 to 16
-

15.

At a water park, a stream of water is shot into the air from the top of a pole that is 12 feet tall. The function graphed on this coordinate grid represents the path of the stream of water from the top of the pole to the ground.

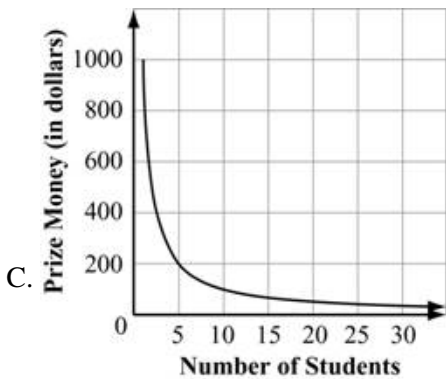
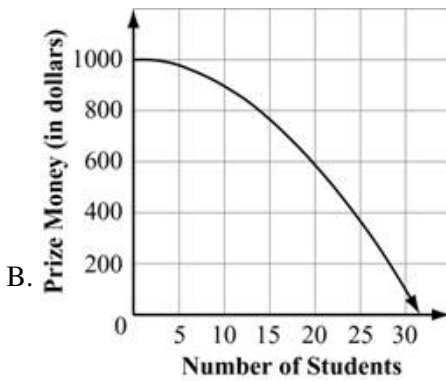
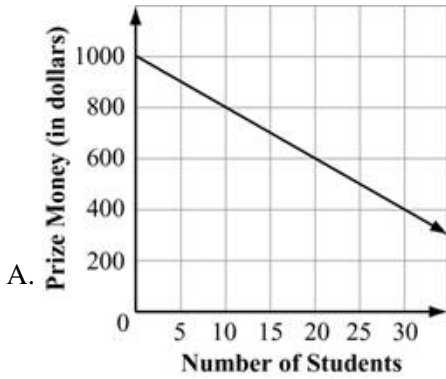


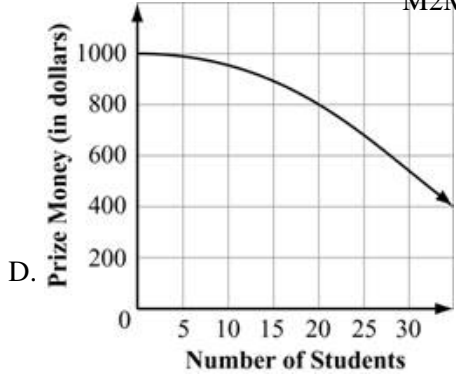
What is the range of the function that represents the path of the stream of water from the top of the pole to the ground?

- A. $-\infty$ to 6
 - B. $-\infty$ to 16
 - C. 0 to 6
 - D. 0 to 16
-

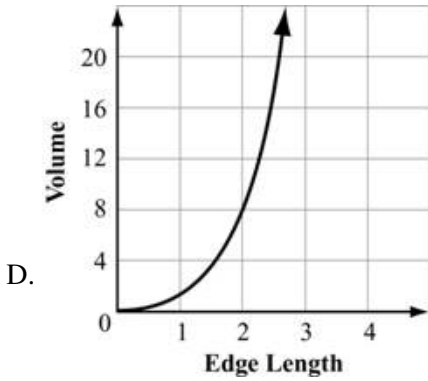
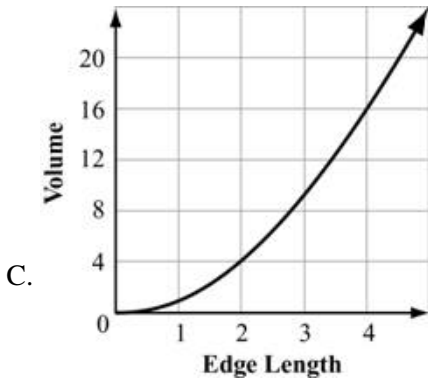
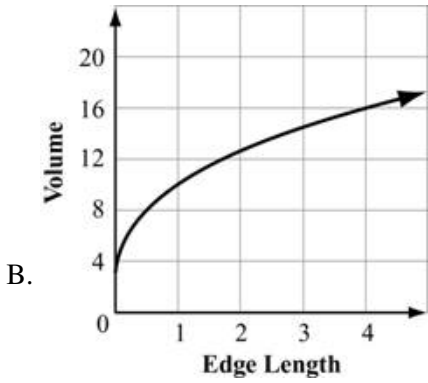
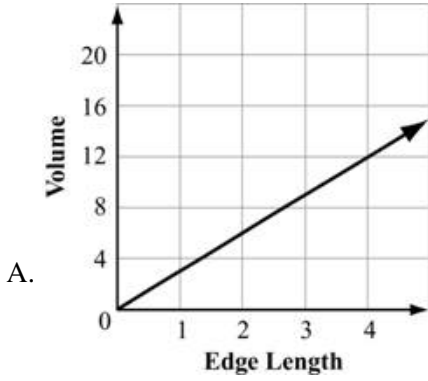
16. A group of students is entering a contest to win \$1000. The students plan to divide the money equally.

Which graph best describes the relationship between the number of students in the group and the amount of prize money each student wins?

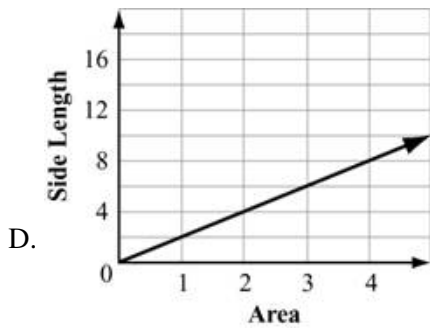
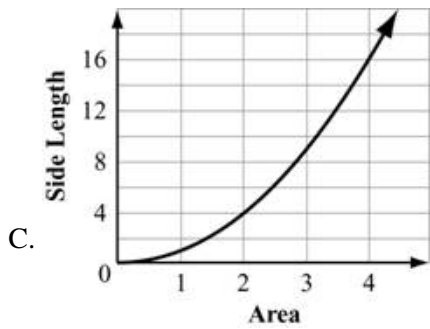
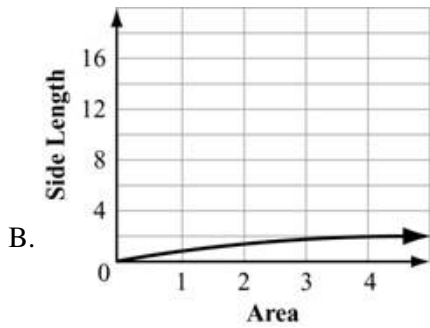
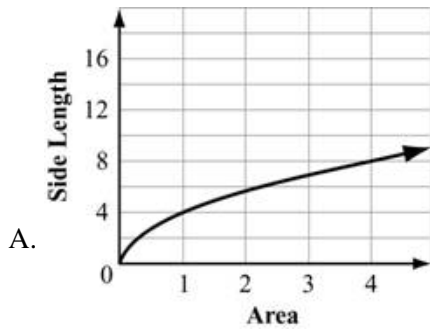




17. The volume of a cube is a function of the length of its edges. Which graph models this relationship?



18. The side length of a square is the square root of its area. Which graph represents side length as a function of area?



19. The function $g(x) = 6x^2$ represents the surface area of a cube that has side length x . This function is a transformation of $f(x) = x^2$.

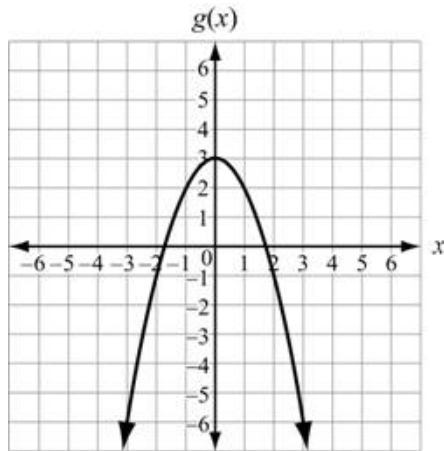
Which phrase describes this transformation?

- A. stretch by a factor of 6
 - B. shrink by a factor of 6
 - C. shift up of 6 units
 - D. shift down of 6 units
-

20. The graph of $f(x) = |x|$ is translated 2 units down on a coordinate plane. Which function represents the result of this translation?

- A. $g(x) = 2 - |x|$
 - B. $g(x) = |x| - 2$
 - C. $g(x) = -2|x|$
 - D. $g(x) = 2|x|$
-

21. Which function is graphed on this coordinate plane?



- A. $g(x) = -x^2 - 3$
 B. $g(x) = -\frac{1}{3}x^2$
 C. $g(x) = -x^2 + 3$
 D. $g(x) = -3x^2$

22. Which function represents the reflection of $f(x) = |x| + 3$ across the x -axis?

- A. $g(x) = |x| + 3$
 B. $g(x) = |x| - 3$
 C. $g(x) = -|x| + 3$
 D. $g(x) = -|x| - 3$

23. A function is described below.

☞☞☞ The function has a maximum point at $(0, 0)$.

☞☞☞ The function increases at a nonconstant rate for $x < 0$.

☞☞☞ The function decreases at a nonconstant rate for $x > 0$.

Which function could match this description?

A. $f(x) = x^2$

B. $f(x) = -x^2$

C. $f(x) = \sqrt{x}$

D. $f(x) = -|x|$

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

A. all real numbers

B. all real numbers except 3

C. all real numbers except -3

D. all real numbers except 3 and -3

25. Which function has zeros at -2 and 4?

A. $f(x) = x^2 + 2x - 8$

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

C. $f(x) = x^2 - 2x - 8$

D. $f(x) = x^2 + 2x - 4$

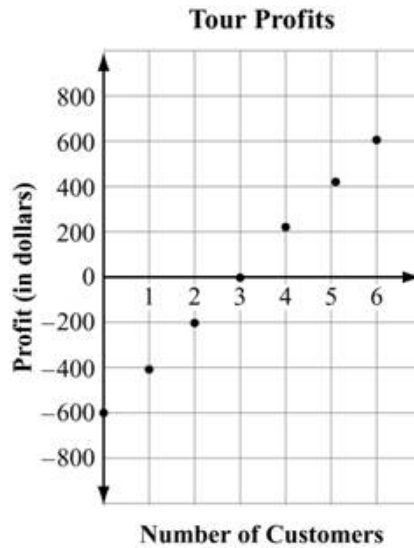
26. This graph shows the number of minutes a student spent bike riding during the past 7 days.



Which of the following is the domain of the graph?

- A. $0 \leq x \leq 7$
 - B. $0 \leq x \leq 180$
 - C. $\{30, 60, 90, 120, 150, 180\}$
 - D. $\{1, 2, 3, 4, 5, 6, 7\}$
-

27. This graph shows the relationship between a touring company's profit and the number of customers on a tour for up to 6 customers.



What does the graph's x -intercept represent in this situation?

- A. the rate of change of the company's profit
- B. the amount of money the company spent on the tour
- C. the number of customers needed for the company to break even
- D. the number of customers needed for the company to make a profit

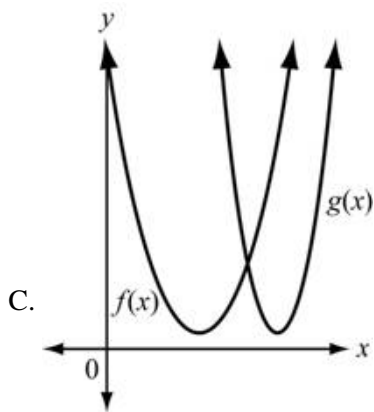
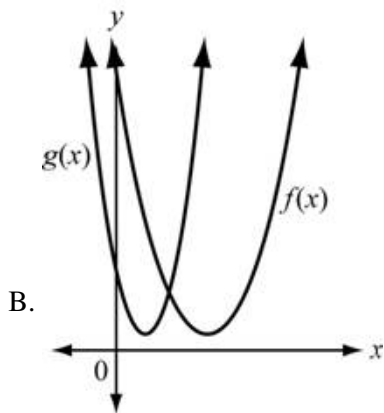
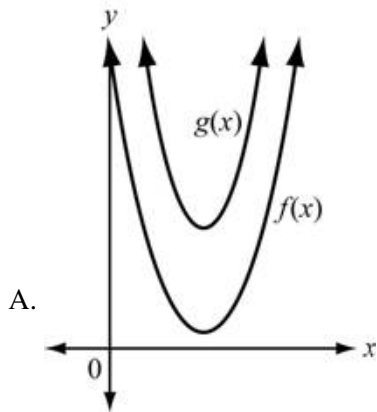
28. Which equation is equivalent to $f(x) = -3(x-2)^2 + 14$?

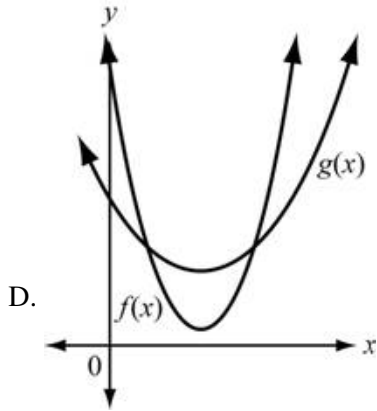
- A. $f(x) = -3x^2 + 2$
- B. $f(x) = -3x^2 + 26$
- C. $f(x) = -3x^2 - 4x + 18$
- D. $f(x) = -3x^2 + 12x + 2$

29. This equation describes the relationship between two quadratic functions.

$$g(x) = 2f(x) + 2$$

Which of the following could represent the graphs of the two functions?

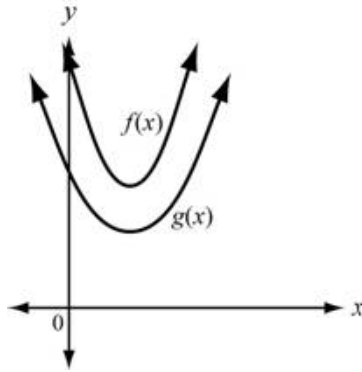




30. The graph of a quadratic function, $f(x)$, is transformed such that its image, $g(x)$, can be described as $g(x) = -f(x-4)$. Which statement describes how the graph of $f(x)$ was transformed?

- A. It was reflected across the x -axis and shifted 4 units to the right.
 - B. It was reflected across the x -axis and shifted 4 units to the left.
 - C. It was reflected across the y -axis and shifted 4 units down.
 - D. It was reflected across the y -axis and shifted 4 units to the left.
-

31. This coordinate plane shows the graphs of two quadratic functions.



Which equation could show the relationship between the two functions?

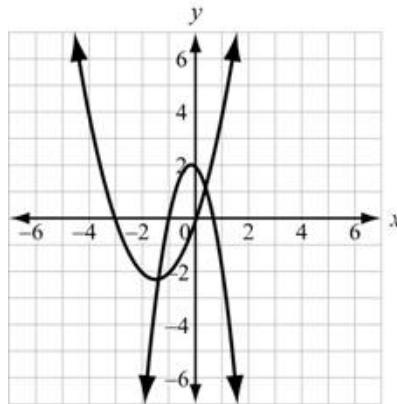
A. $g(x) = \frac{1}{2}f(x) + 2$

B. $g(x) = \frac{1}{2}f(x) - 2$

C. $g(x) = 2f(x) + 2$

D. $g(x) = 2f(x) - 2$

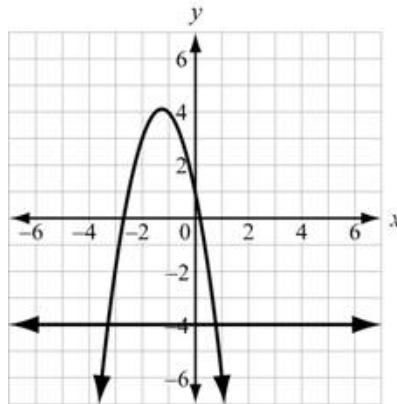
32. This graph shows the functions $f(x) = x^2 + 3x$ and $f(x) = -3x^2 - x + 2$.



Based on the graph, which of the following are the best estimates of the solutions of the equation $x^2 + 3x = -3x^2 - x + 2$?

- A. $x = -1.4$ and 0.4
 - B. $x = -1$ and 0
 - C. $x = -2.2$ and 1.2
 - D. $x = -2.3$ and 2.1
-

33. The graphs of the linear function $f(x) = -4$ and the quadratic function $g(x) = -2x^2 - 5x + 1$ are shown on this coordinate plane.



Which of the following are the best approximate solutions of $-2x^2 - 5x + 1 = -4$?

- A. $x = -4.0$ and 1.0
- B. $x = -3.3$ and 0.8
- C. $x = -2.7$ and 0.2
- D. $x = -1.3$ and 4.1

34. Which equation has no real solutions?

- A. $x^2 - 3 = 0$
- B. $x^2 + 2x + 3 = 0$
- C. $-2x^2 + x + 3 = 0$
- D. $2x^2 + 2\sqrt{2}x + 1 = 0$

35. What are the solutions of the equation $x^2 = 2x - 5$?

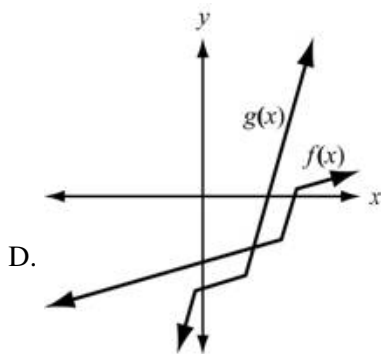
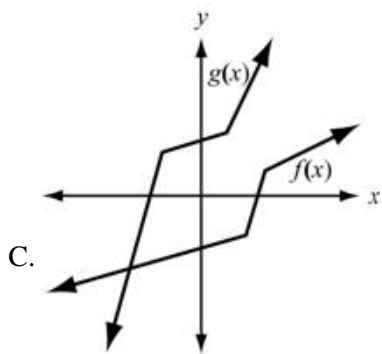
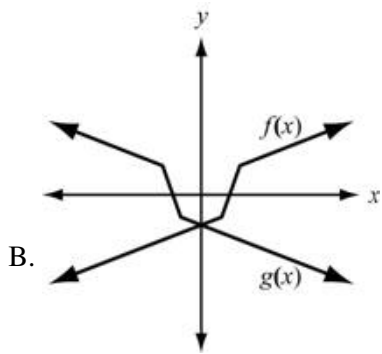
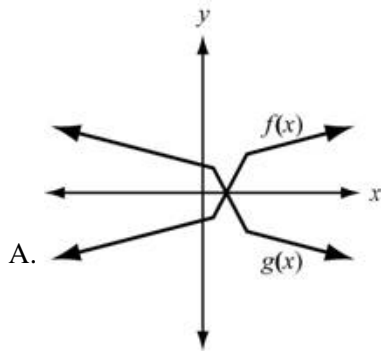
A. $1 \pm 2i$

B. $2 \pm 4i$

C. $1 \pm i\sqrt{6}$

D. $-1 \pm \sqrt{6}$

36. In which graph are $f(x)$ and $g(x)$ inverse functions?



37. Which function is NOT an inverse of itself?

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

B. $f(x) = -x$

C. $f(x) = x - 1$

D. $f(x) = \frac{1}{x}$

38. If $f(x) = \frac{3}{x+1}$, which equation represents the inverse function of $f(x)$?

A. $f^{-1}(x) = -\frac{3}{x+1}$

B. $f^{-1}(x) = \frac{3}{x} - 1$

C. $f^{-1}(x) = \frac{x+1}{3}$

D. $f^{-1}(x) = \frac{3x}{1+x}$

39. Which expression is equivalent to $-2i$?

A. $\frac{2}{i}$

B. $-2i^3$

C. $2i^5$

D. $4 - 6i$

40. The values of three complex numbers are shown.

$$X = -2 + i$$

$$Y = 3 - 2i$$

$$Z = 1 + i$$

Which expression is equivalent to $\frac{X - Y}{Z}$?

A. $-4 + 4i$

B. $-3 + 2i$

C. $-1 - i$

D. $-1 + 4i$

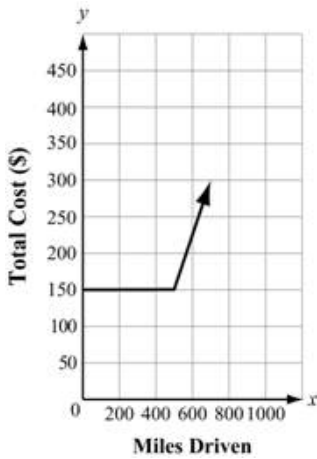
Answer Key

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

2. A) - 12

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

4. A)



5. B) $f(x) = |x - 2| + 6$

6. C) \$4096

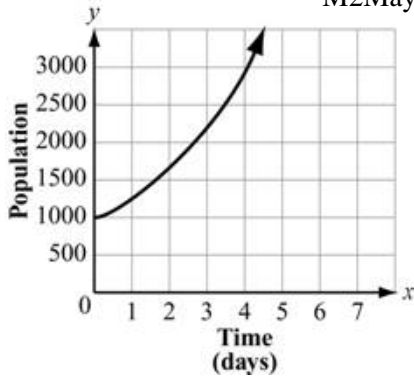
7. D) $\left(\frac{3}{2}\right)^2$

8. A) $f(x) = -6(2^x) + 2$

9. D) $f(n) = 500\left(\frac{1}{2}\right)^{n-1}$

10. A) $a(3^x)$

11. C)



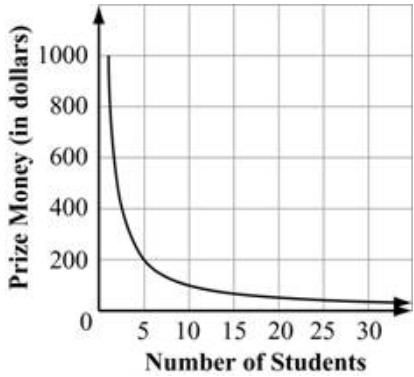
12. B) $-\frac{3}{2}$

13. C) $x < -1$ or $x > 1.9$

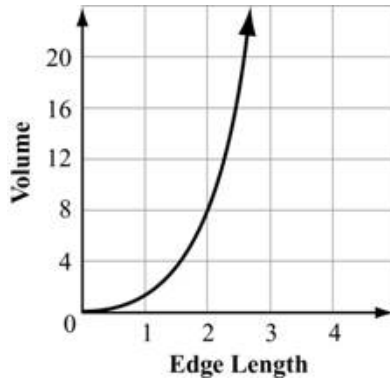
14. C) 0 to 6

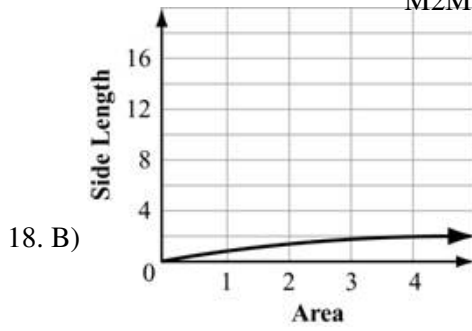
15. D) 0 to 16

16. C)



17. D)





19. A) stretch by a factor of 6

20. B) $g(x) = |x| - 2$

21. C) $g(x) = -x^2 + 3$

22. D) $g(x) = -|x| - 3$

23. B) $f(x) = -x^2$

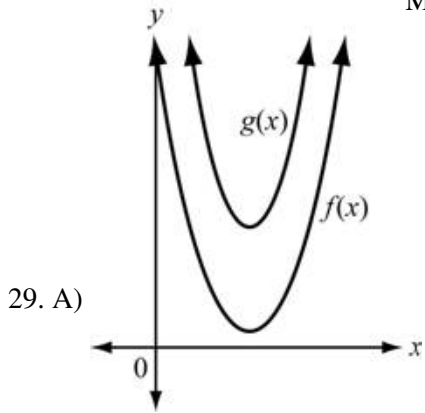
24. B) all real numbers except 3

25. C) $f(x) = x^2 - 2x - 8$

26. D) $\{1, 2, 3, 4, 5, 6, 7\}$

27. C) the number of customers needed for the company to break even

28. D) $f(x) = -3x^2 + 12x + 2$



30. A) It was reflected across the x -axis and shifted 4 units to the right.

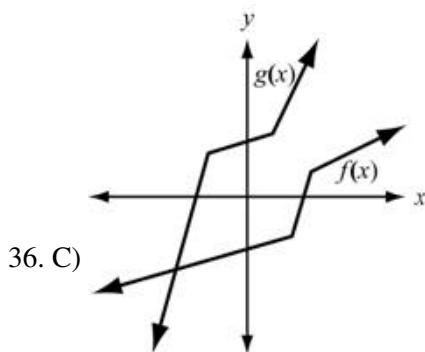
31. A) $g(x) = \frac{1}{2}f(x) + 2$

32. A) $x = -1.4$ and 0.4

33. B) $x = -3.3$ and 0.8

34. B) $x^2 + 2x + 3 = 0$

35. A) $1 \pm 2i$



37. C) $f(x) = x - 1$

38. B) $f^{-1}(x) = \frac{3}{x} - 1$

39. A) $\frac{2}{i}$

40. D) $-1 + 4i$