

Name:

Class Period:

1. In baseball, a pitcher's earned run average is used to measure how effective the pitcher is. The earned run average, A , is calculated using the formula shown, where E is the number of earned runs and N is the number of innings the pitcher pitched.

$$A = \frac{9E}{N}$$

Ⓐ $E = \frac{A}{9N}$

Ⓑ $E = \frac{AN}{9}$

Ⓒ $E = \frac{9A}{N}$

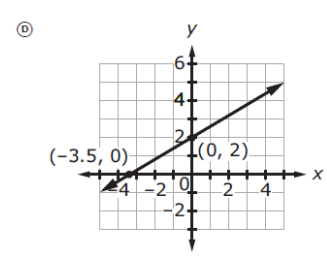
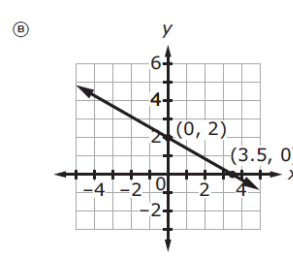
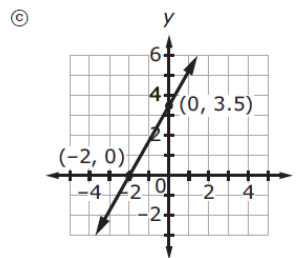
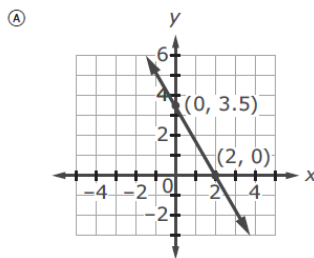
Ⓓ $E = 9AN$

Which equation correctly solves the formula for the variable E ?

2. A function is shown.

$$7x + 4y = 14$$

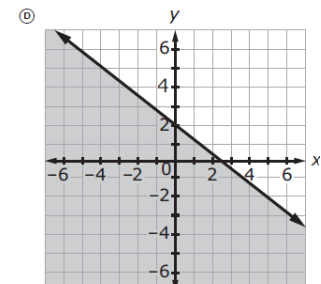
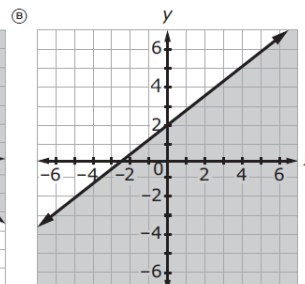
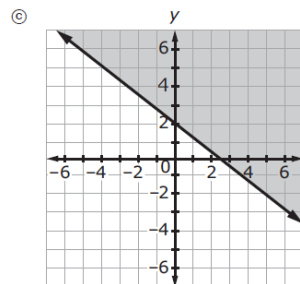
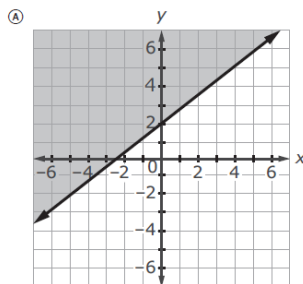
Which graph represents the function?



3. An inequality is shown.

$$4x + 5y \geq 10$$

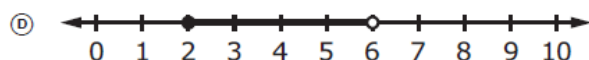
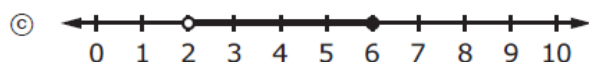
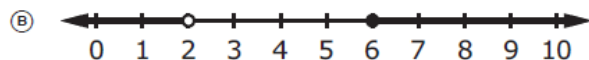
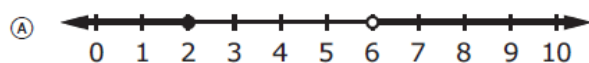
Which graph represents the solution set of the inequality?



4. A compound inequality is shown.

$$2x - 1 \leq 3 \text{ or } \frac{1}{2}x + 4 > 7$$

Which graph represents the solution set of the compound inequality?



5. An inequality is shown.

$$-3x + 7 \geq -x - 5$$

What is the solution set for x ?

Ⓐ $\{x \mid x \leq 6\}$

Ⓑ $\{x \mid x \geq 6\}$

Ⓒ $\{x \mid x \leq -6\}$

Ⓓ $\{x \mid x \geq -6\}$

6. What is the sum of $(2x^3 + 4x)$ and $(3x^3 + 5x)$?

Ⓐ $14x^6$

Ⓑ $14x^8$

Ⓒ $5x^3 + 9x$

Ⓓ $5x^6 + 9x^2$

7. A system of equations is shown.

$$\begin{aligned} y &= 2x + 2 \\ 2x + 5y &= 19 \end{aligned}$$

What is the solution to the system?

Ⓐ $\left(\frac{3}{4}, 3\frac{1}{2}\right)$

Ⓑ $\left(1\frac{1}{8}, 4\frac{1}{4}\right)$

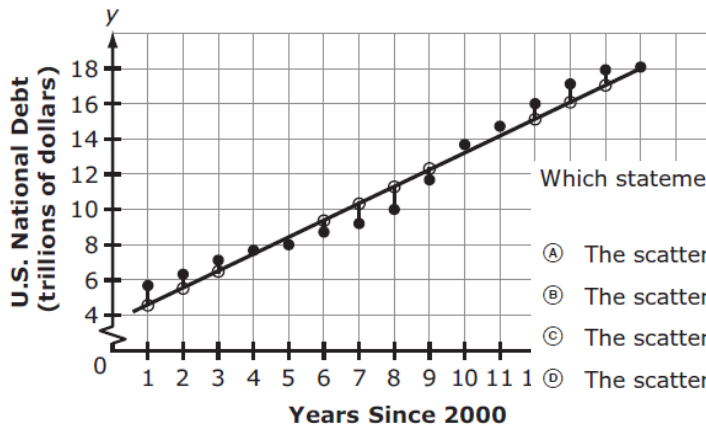
Ⓒ $\left(1\frac{2}{3}, 5\frac{1}{3}\right)$

Ⓓ $\left(3\frac{1}{4}, 2\frac{1}{2}\right)$

8. Which expression is equivalent to $\sqrt{3}$? (A) $2^{\frac{1}{3}}$ (C) $(\frac{1}{2})^3$

(B) $3^{\frac{1}{2}}$ (D) $(\frac{1}{3})^2$

9. A scatter plot of the U.S. national debt from 2001 to 2016, including a linear equation and its residuals modeling the data, is shown.



Which statement correctly interprets the scatter plot?

- (A) The scatter plot shows a weak positive correlation.
- (B) The scatter plot shows a weak negative correlation.
- (C) The scatter plot shows a strong positive correlation.
- (D) The scatter plot shows a strong negative correlation.

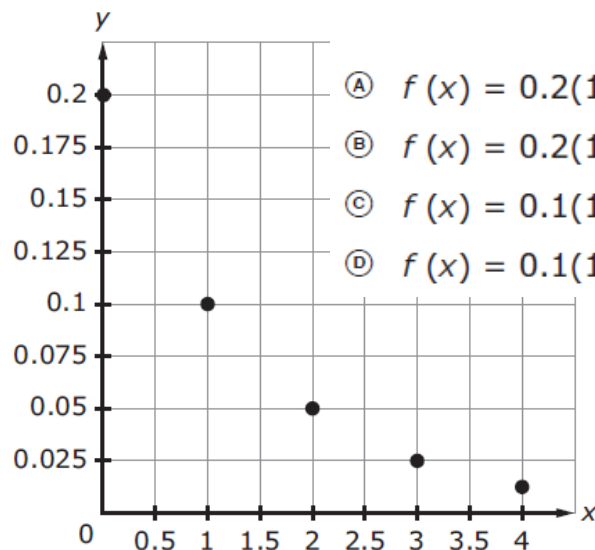
10. An equation is shown.

$$3x^2 - 21 = 222$$

What is one exact solution to the equation? $x =$

11. Five points from a function, f , are plotted in the first quadrant of the coordinate plane, as shown.

Which equation could represent the function?

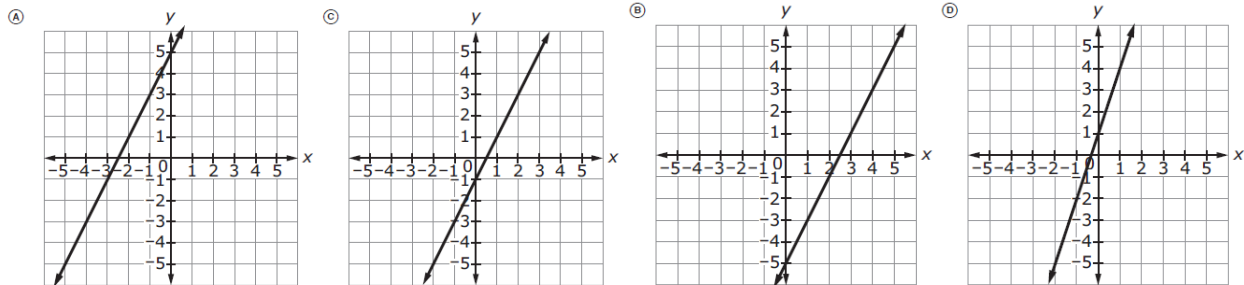


- (A) $f(x) = 0.2(1 - 0.1)^x$
- (B) $f(x) = 0.2(1 - 0.5)^x$
- (C) $f(x) = 0.1(1 - 0.05)^x$
- (D) $f(x) = 0.1(1 - 0.25)^x$

12. Which expression is equivalent to $(7k + 2)(5k - 9)$?
 Ⓐ $35k^2 - 18$
 Ⓑ $-18k - 18$
 Ⓒ $35k^2 - 53k - 18$
 Ⓓ $35k^2 - 73k - 18$

13. A function is shown. Which graph represents the function?

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



14. Garrett buys a large bag of dog food. He feeds his dog 2 cups of dog food each day.

Which statement describes the type of function that represents the amount of dog food in the bag after x days?

- Ⓐ positive linear
 Ⓑ negative linear
 Ⓒ exponential
 Ⓓ quadratic

15. Which table could represent a quadratic function?

Ⓐ

x	$f(x)$
0	3
1	9
2	27
3	81

Ⓒ

x	$h(x)$
-1	6
0	5
1	6
2	9

Ⓑ

x	$g(x)$
0	-2
1	-4
2	-6
3	-8

Ⓓ

x	$j(x)$
-3	7
-2	7
-1	7
0	7

16. Which function has the greatest slope?

Ⓐ $y = \frac{5}{3}x + 1$

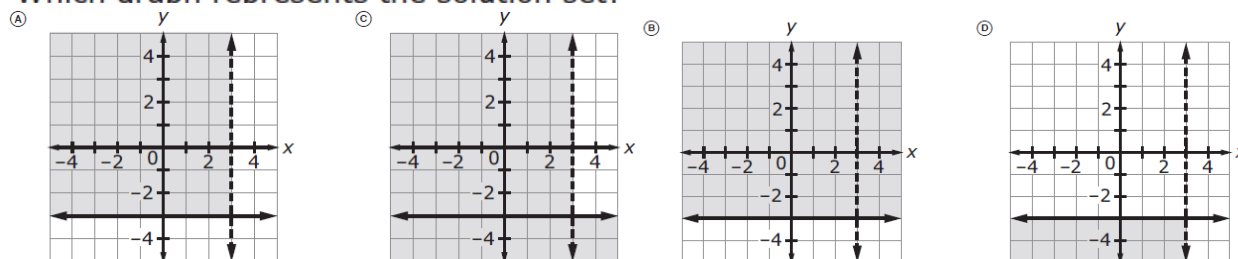
Ⓑ $y = -x + 8$

Ⓒ $y = \frac{3}{4}x - \frac{5}{4}$

Ⓓ $y = \frac{3}{2}x + 3$

17. A system of inequalities is shown. $x < 3$
 $y \geq -3$

Which graph represents the solution set?



18. A ball was dropped from a balcony at a height of 20 feet above level ground. The height, in feet, of the ball after t seconds is modeled by function shown.

$$y = -16t^2 + 20$$

What is the range of the function in terms of the situation described?

- (A) $0 \leq t$
- (B) $0 \leq y$
- (C) $0 \leq t \leq 20$
- (D) $0 \leq y \leq 20$

19. Which equation models exponential growth?

(A) $y = 2\left(\frac{1}{5}\right)^x$ (C) $y = 2\left(1 - \frac{1}{5}\right)^x$

(B) $y = 2(5.0)^x$ (D) $y = 2(1 - 0.5)^x$

20. Which function decays exponentially?

(A) $f(x) = \frac{1}{5}x$ (C) $h(x) = 5^x$

(B) $g(x) = 5x$ (D) $j(x) = \left(\frac{1}{5}\right)^x$

21. A line with a slope of -0.2 passes through the point $(11, 5)$.

Select numbers to complete the equation of the line in point-slope form.

$$y - [\text{(A) } -0.2 \text{ (B) } 0 \text{ (C) } 5 \text{ (D) } 11] = [\text{(A) } -0.2 \text{ (B) } 0 \text{ (C) } 5 \text{ (D) } 11]$$

$$(x - [\text{(A) } -0.2 \text{ (B) } 0 \text{ (C) } 5 \text{ (D) } 11])$$

22. An expression is given, where $x \neq 0$.

$$\frac{4x^2 - 18x + 6}{2x}$$

(A) $2x - 9 + \frac{3}{x}$ (C) $2x^3 - 9x^2 + 3x$

Which expression is equivalent?

(B) $2x^2 - 16x +$ (D) $\frac{2}{x^3} - \frac{9}{x^2} + \frac{3}{x}$

23. An equation is given.

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

Which type of function does the equation represent?

- (A) cubic
- (B) quadratic
- (C) exponential
- (D) square root

24. A function is given

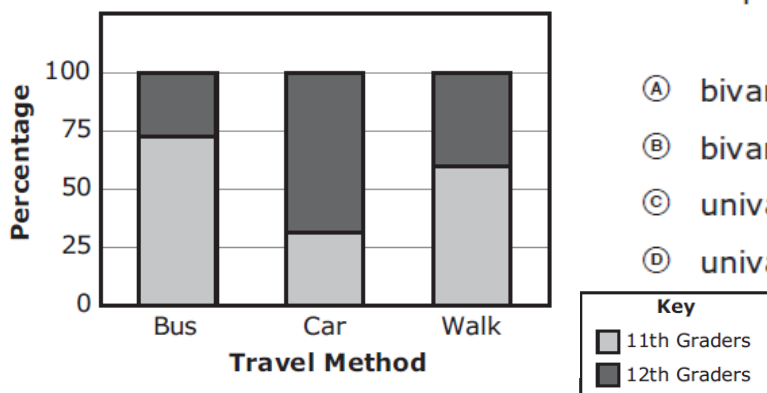
$$h(x) = \frac{1}{5}x^2$$

How can be $h(15)$ evaluated?

- (A) by multiplying $\frac{1}{5}$ by the square of 15
- (B) by multiplying the square of $\frac{1}{5}$ by the square of 15
- (C) by multiplying $\frac{1}{5}$ by the square of 15, then dividing by 15
- (D) by multiplying the square of $\frac{1}{5}$ by the square of 15, then dividing by 15

25. Maribel asked a random group of upper-class students at her school which grade they are in and how they traveled to school in the morning. The data are shown in the segmented bar chart.

How Students Travel to School



Which pair of terms describes the data?

- (A) bivariate and numerical
- (B) bivariate and categorical
- (C) univariate and numerical
- (D) univariate and categorical

26. An expression is given.

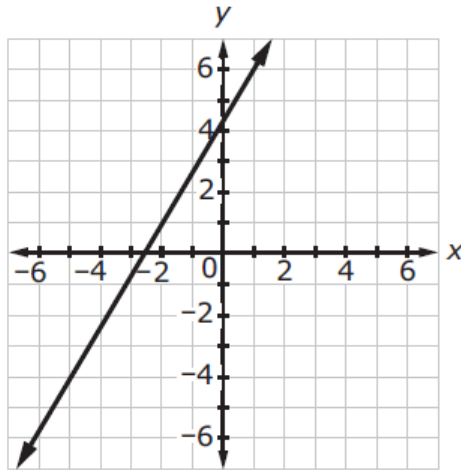
$$42r^3s^2 - 35r^2s^3$$

Which expression is equivalent?

- (A) $7rs(6s - 5r)$
- (B) $7rs(6rs - 5rs)$
- (C) $7r^2s^2(6r - 5s)$
- (D) $7r^2s^2(6s - 5r)$

27. The graph of a line is shown.

Which equation represents the line?



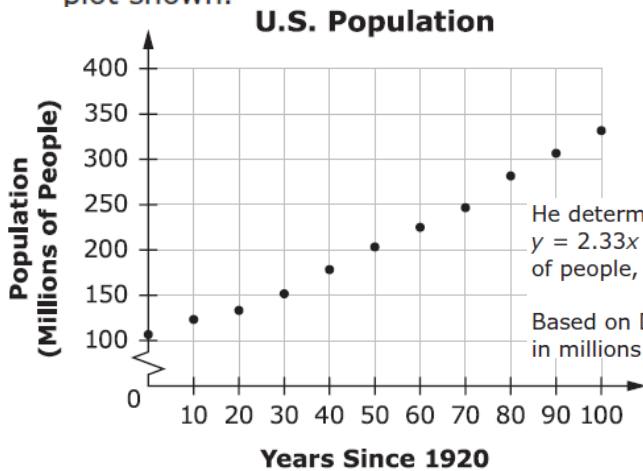
(A) $y = \frac{3}{5}x - \frac{13}{5}$

(B) $y = \frac{3}{5}x + \frac{13}{3}$

(C) $y = \frac{5}{3}x - \frac{13}{5}$

(D) $y = \frac{5}{3}x + \frac{13}{3}$

28. Darren collects data on the U.S. population from 1920 to 2020. He graphs the population and the number of years since 1920 in the scatter plot shown.



He determines the equation for the line of best fit to be $y = 2.33x + 92.05$ where y represents the population, in millions of people, and x represents the number of years since 1920.

Based on Darren's model, what is the projected U.S. population, in millions of people, for 2040?

29. Bashir has \$3410 to invest in two different investment accounts, Account A and Account B. The accounts earn simple interest for one year.

- Account A earns 6% interest.
- Account B earns 2% interest.
- He wants to earn at least \$196 in interest.

Bashir puts x dollars in Account A and y dollars in Account B.

Which system of constraints represents the situation?

(A) $x + y = 3410$
 $0.02x + 0.06y \geq 196$

(B) $x + y = 3410$
 $0.06x + 0.02y \geq 196$

(C) $0.02x + 0.06y = 3410$
 $x + y \geq 196$

(D) $0.06x + 0.02y \geq 3410$
 $x + y \geq 196$

30. A rental company charges \$2 per hour to rent a bicycle. A table showing the prices of renting one bicycle for different amounts of time is shown.

Which type of function models the price for renting one bicycle as a function of time?

- Ⓐ increasing linear
- Ⓑ decreasing linear
- Ⓒ increasing exponential
- Ⓓ decreasing exponential

31. An artist earns a profit from selling y paintings. His profit, P , in dollars, is modeled with the given equation.

$$P = (200y + 23.25) - (10.53y)$$

His profit is the difference in the amount of money he earns from selling his paintings and the cost of making the paintings.

Ⓐ 23.25

Which expression represents the cost of making y paintings?

Ⓑ $10.53y$

Ⓒ $200y + 23.25$

Ⓓ $189.47y + 23.25$

32. Cardiac output, D , is the amount of blood that the heart pumps per minute. The value of D can be found using the formula shown, where V is the amount of blood that the heart pumps with each heartbeat and R is the number of heartbeats per minute.

$$D = V \cdot R \quad V = \text{[input box]}$$

Complete the equation to represent V in terms of D and R .

33. Two divers are underwater. One diver is at a depth of 32 meters, while the other diver is at a different depth. The given equation can be used to find the possible depths, x , in meters, of the other diver.

$$|x - 32| = 11$$

Enter values to complete the sentence about the other diver's depth, in meters.

The other diver is at a depth of either ____ or ____ meters.

34. The equation of a linear function, q , and a table of values of a linear function, r , are shown.

$$q(x) = 2x - 1$$

x	$r(x)$
0	-2
1	4
2	10
3	16

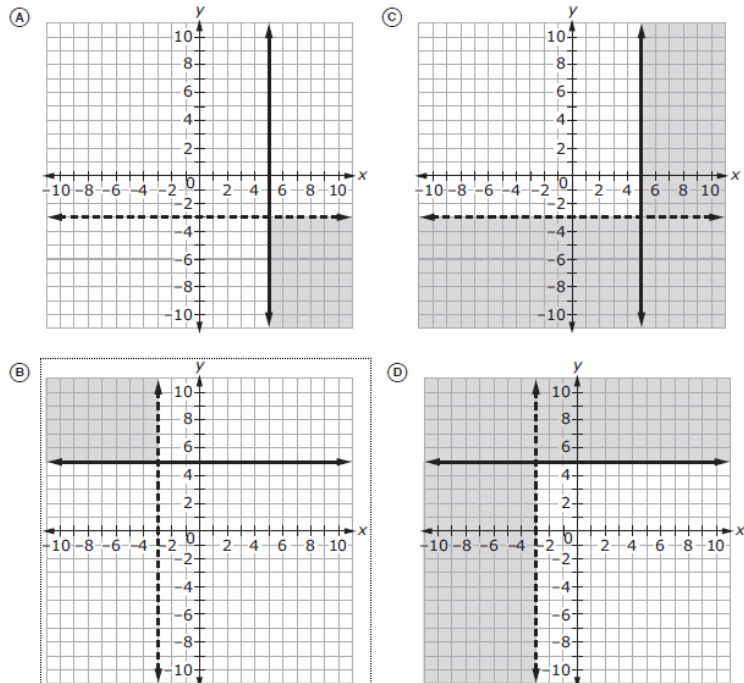
Which statement correctly compares the slopes and the y -intercepts of the two functions?

- (A) Function r has a lesser y -intercept and a slope that is 2 times the slope of function q .
- (B) Function r has a lesser y -intercept and a slope that is 3 times the slope of function q .
- (C) Function r has a greater y -intercept and a slope that is 2 times the slope of function q .
- (D) Function r has a greater y -intercept and a slope that is 3 times the slope of function q .

35. A system of inequalities is given.

$$\begin{aligned} x &\geq 5 \\ y &< -3 \end{aligned}$$

Which graph represents the solution set?



36. An equation is shown. $x^2 - 15x = -14$

$x =$

What are the two solutions to the equation?

$x =$

37. A function, f , is given.

$$f(x) = x^2 + 12x + 20$$

Select terms to describe the end behavior of the function.

As x approaches $-\infty$, $f(x)$ approaches [(A) $-\infty$ (B) ∞ (C) 0].

As x approaches ∞ , $f(x)$ approaches [(A) $-\infty$ (B) ∞ (C) 0].

38. The expression $\sqrt[3]{18} \cdot 5\sqrt[3]{6}$ is equivalent to $15\sqrt[3]{x}$.

What is the value of x ?

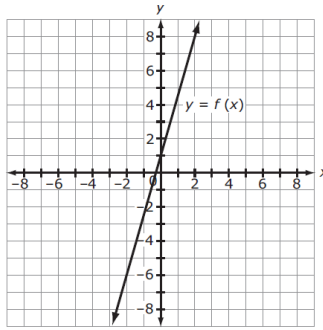
39. Margo surveys 150 high school juniors and seniors about their favorite types of dipping sauce. She records the results in the table shown.

Favorite Dipping Sauce

	Barbeque	Honey Mustard	Ranch	Sweet and Sour
Juniors	19	26	23	11
Seniors	7	22	30	12

How many more high school juniors and seniors chose honey mustard sauce than sweet and sour sauce?

40. The graph of $y = f(x)$ and a table of values for an exponential function $y = g(x)$ are shown.



x	$g(x)$
-2	0.25
-1	0.5
0	1
1	2
2	4

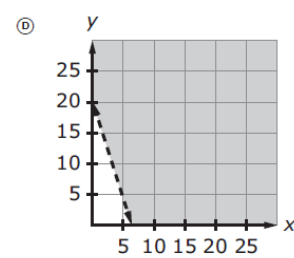
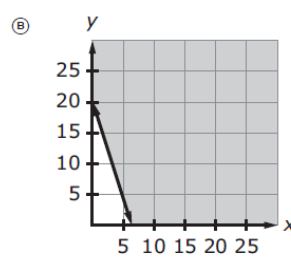
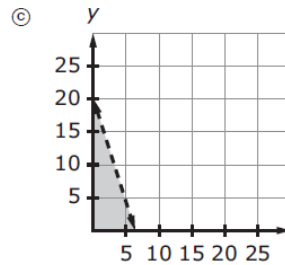
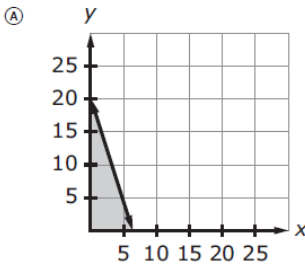
Which statement correctly compares the graphs of the functions?

- Ⓐ As the values of x increase, $g(x)$ will eventually be greater than $f(x)$.
- Ⓑ As the values of x increase, $f(x)$ will eventually be greater than $g(x)$.
- Ⓒ The value of the y -intercept of $y = f(x)$ is greater than the value of the y -intercept of $y = g(x)$.
- Ⓓ The value of the y -intercept of $y = g(x)$ is greater than the value of the y -intercept of $y = f(x)$.

41. Sanjay buys x boxes of hot wings and y bottles of soda for a party. The numbers of boxes of hot wings and bottles of soda he can buy with \$40 can be represented with the inequality shown.

$$40 \geq 6x + 2y$$

Which graph represents all possible solutions for x and y ?



42. Janelle buys blackberries and raspberries to make pies.

- Blackberries cost \$8 per pound.
- Raspberries cost \$9 per pound.
- Janelle can spend a maximum of \$40.

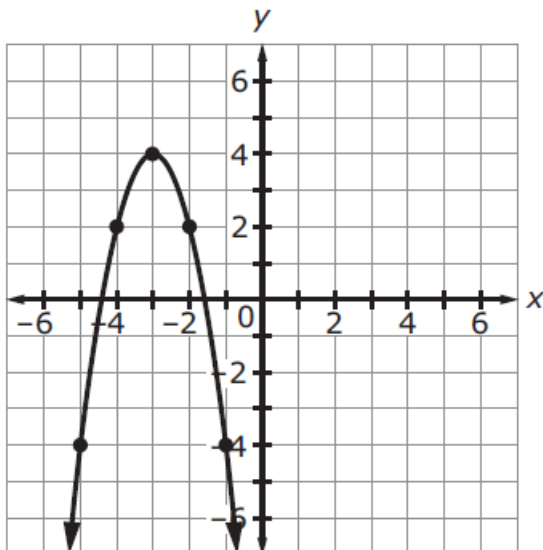
Create an inequality to represent how many pounds of blackberries, b , and raspberries, r , Janelle can buy.

43. Cynthia buys some tools. She creates exponential function V to predict the value of her tools after t years. She predicts her tools will have a value of \$380 after 1 year and a value of \$361 after 2 years.

Which equation represents function V ?

- (A) $V(t) = 400(1 - 0.05)^t$
- (B) $V(t) = 399(1 - 0.19)^t$
- (C) $V(t) = 380(1 - 0.05)^t$
- (D) $V(t) = 380(1 - 0.19)^t$

44. The graph of a quadratic function is shown.



Which equation represents the function?

- (A) $y = -2(x + 3)^2 + 4$
- (B) $y = -(x - 3)^2 + 4$
- (C) $y = (x + 3)^2 + 4$
- (D) $y = 6(x + 3)^2 - 4$

(A) $\sqrt{3}$ (D) $\frac{2\sqrt{6}}{2\sqrt{2}}$

45. Select all the values that are equivalent to $\frac{\sqrt{24}}{\sqrt{8}}$. (B) $\frac{1}{\sqrt{3}}$ (E) $\frac{4\sqrt{6}}{\sqrt{8}}$