

**Practice Algebra 1 Keystone Exam**  
**MODULE 1**  
**OPERATIONS WITH REAL NUMBERS**

Name \_\_\_\_\_

Which of the following inequalities is true for **all** real values of  $x$ ?

- A.  $x^3 \geq x^2$
- B.  $3x^2 \geq 2x^3$
- C.  $(2x)^2 \geq 3x^2$
- D.  $3(x - 2)^2 \geq 3x^2 - 2$

An expression is shown below.

$$2\sqrt{51x}$$

Which value of  $x$  makes the expression equivalent to  $10\sqrt{51}$ ?

- A. 5
- B. 25
- C. 50
- D. 100

1.) Order the following numbers from greatest to least.

$$8.\bar{4}, \frac{25}{3}, \sqrt{72}, \frac{35}{4}$$

A.)  $\sqrt{72}, \frac{25}{3}, \frac{35}{4}, 8.\bar{4}$

B.)  $\frac{25}{3}, \sqrt{72}, \frac{35}{4}, 8.\bar{4}$

C.)  $\frac{35}{4}, \sqrt{72}, 8.\bar{4}, \frac{25}{3}$

D.)  $\frac{35}{4}, \frac{25}{3}, 8.\bar{4}, \sqrt{72}$

An expression is shown below.

$$\sqrt{87x}$$

For which value of  $x$  should the expression be further simplified?

- A.  $x = 10$
- B.  $x = 13$
- C.  $x = 21$
- D.  $x = 38$

Two monomials are shown below.

$$450x^2y^5 \quad 3,000x^4y^3$$

What is the least common multiple (LCM) of these monomials?

- A.  $2xy$
- B.  $30xy$
- C.  $150x^2y^3$
- D.  $9,000x^4y^5$

Simplify:

$$2(2\sqrt{4})^{-2}$$

- A.  $\frac{1}{8}$
- B.  $\frac{1}{4}$
- C. 16
- D. 32

A theme park charges \$52 for a day pass and \$110 for a week pass. Last month, 4,432 day passes were sold and 979 week passes were sold. Which is the **closest estimate** of the total amount of money paid for the day and week passes for last month?

- A. \$300,000
- B. \$400,000
- C. \$500,000
- D. \$600,000

What is the value of the expression  $-3x^2y + 4x$  when  $x = -4$  and  $y = 2$ ?

- 1) -112
- 2) -80
- 3) 80
- 4) 272

**MODULE 1**  
**OPERATIONS WITH POLYNOMIALS**

A polynomial expression is shown below.

$$(mx^3 + 3)(2x^2 + 5x + 2) - (8x^5 + 20x^4)$$

The expression is simplified to  $8x^3 + 6x^2 + 15x + 6$ .  
 What is the value of  $m$ ?

- A. -8
- B. -4
- C. 4
- D. 8

When the expression  $x^2 - 3x - 18$  is factored completely, which is one of its factors?

- A.  $(x - 2)$
- B.  $(x - 3)$
- C.  $(x - 6)$
- D.  $(x - 9)$

Simplify:

$$\frac{-3x^3 + 9x^2 + 30x}{-3x^3 - 18x^2 - 24x}; \quad x \neq -4, -2, 0$$

- A.  $-\frac{1}{2}x^2 - \frac{5}{4}x$
- B.  $x^3 - \frac{1}{2}x^2 - \frac{5}{4}x$
- C.  $\frac{x+5}{x-4}$
- D.  $\frac{x-5}{x+4}$

If  $y = 3x + 5$ , and  $z = x^2 + 2x - 5$ , what is  $yz$ ?

- A  $2x^3 + 11x^2 + 5x - 25$
- B  $3x^3 + 13x^2 + 10x - 25$
- C  $3x^2 + 16x^2 + 10x - 25$
- D  $3x^3 + 11x^2 - 5x - 25$

The expression  $9x^2 - 100$  is equivalent to

- (1)  $(9x - 10)(x + 10)$
- (2)  $(3x - 10)(3x + 10)$
- (3)  $(3x - 100)(3x - 1)$
- (4)  $(9x - 100)(x + 1)$

Simplify  $(4x + 3) - (5x - 2) + 17x + 5 - x$ .

- A  $15x + 10$
- B  $25x + 10$
- C  $20x^2 + 23x - 1$
- D  $15x + 6$

Which expression is equivalent to  $(3x^2)^3$ ?

- (1)  $9x^5$
- (2)  $9x^6$
- (3)  $27x^5$
- (4)  $27x^6$

Factor  $25x^5y^3 - 40x^4y^2 + 15x^2y^2 - 5xy^2 + 55xy$ .

- A  $5xy(5x^4y^2 - 8x^3y + 3xy - 5y + 11)$
- B  $5(5x^4y^2 - 8x^3y + 3xy - 5y + 11)$
- C  $\frac{5x^4y^2 - 8x^3y + 3xy - 5y + 11}{5xy}$
- D  $(25xy - 40xy + 15xy - 5xy + 55xy)(x^4y^2 - x^3y + y + 1)$

Factor  $5x^2 - 25x - 180$ .

- A  $(x + 6)(x - 6)(5x)$
- B  $(x + 5)(x - 36)$
- C  $(x + 30)(5x - 60)$
- D  $5(x + 4)(x - 9)$

**MODULE 1**  
**LINEAR EQUATIONS**

Anna burned 15 calories per minute running for  $x$  minutes and 10 calories per minute hiking for  $y$  minutes. She spent a total of 60 minutes running and hiking and burned 700 calories. The system of equations shown below can be used to determine how much time Anna spent on each exercise.

$$15x + 10y = 700$$

$$x + y = 60$$

What is the value of  $x$ , the minutes Anna spent running?

- A. 10
- B. 20
- C. 30
- D. 40

35. Solve for  $x$ :  $7(2x - 8) = 77x$

- A.)  $x = \frac{19}{2}$
- B.)  $x = \frac{8}{9}$
- C.)  $x = -\frac{8}{9}$
- D.)  $x = \frac{2}{3}$

One of the steps Jamie used to solve an equation is shown below.

$$\begin{aligned} -5(3x + 7) &= 10 \\ -15x + -35 &= 10 \end{aligned}$$

Which statements describe the procedure Jamie used in this step and identify the property that justifies the procedure?

- A. Jamie added  $-5$  and  $3x$  to eliminate the parentheses. This procedure is justified by the associative property.
- B. Jamie added  $-5$  and  $3x$  to eliminate the parentheses. This procedure is justified by the distributive property.
- C. Jamie multiplied  $3x$  and  $7$  by  $-5$  to eliminate the parentheses. This procedure is justified by the associative property.
- D. Jamie multiplied  $3x$  and  $7$  by  $-5$  to eliminate the parentheses. This procedure is justified by the distributive property.

What is the value of  $x$  in the equation  $\frac{2}{x} - 3 = \frac{26}{x}$ ?

- (1)  $-8$
- (2)  $-\frac{1}{8}$
- (3)  $\frac{1}{8}$
- (4)  $8$

Samantha and Maria purchased flowers. Samantha purchased 5 roses for  $x$  dollars each and 4 daisies for  $y$  dollars each and spent \$32 on the flowers. Maria purchased 1 rose for  $x$  dollars and 6 daisies for  $y$  dollars each and spent \$22. The system of equations shown below represents this situation.

$$5x + 4y = 32$$

$$x + 6y = 22$$

Which statement is true?

- A. A rose costs \$1 more than a daisy.
- B. Samantha spent \$4 on each daisy.
- C. Samantha spent more on daisies than she did on roses.
- D. Samantha spent over 4 times as much on daisies as she did on roses.

If the formula for the perimeter of a rectangle is  $P = 2l + 2w$ , then  $w$  can be expressed as

- (1)  $w = \frac{2l - P}{2}$
- (2)  $w = \frac{P - 2l}{2}$
- (3)  $w = \frac{P - l}{2}$
- (4)  $w = \frac{P - 2w}{2l}$

Francisco purchased  $x$  hot dogs and  $y$  hamburgers at a baseball game. He spent a total of \$10. The equation below describes the relationship between the number of hot dogs and the number of hamburgers purchased.

$$3x + 4y = 10$$

The ordered pair  $(2, 1)$  is a solution of the equation. What does the solution  $(2, 1)$  represent?

- A. Hamburgers cost 2 times as much as hot dogs.
- B. Francisco purchased 2 hot dogs and 1 hamburger.
- C. Hot dogs cost \$2 each and hamburgers cost \$1 each.
- D. Francisco spent \$2 on hot dogs and \$1 on hamburgers.

**MODULE 1**  
**LINEAR INEQUALITIES**

A compound inequality is shown below.

$$5 < 2 - 3y < 14$$

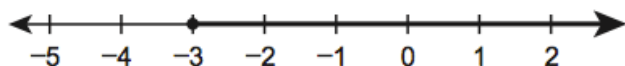
What is the solution of the compound inequality?

- A.  $-4 > y > -1$
- B.  $-4 < y < -1$
- C.  $1 > y > 4$
- D.  $1 < y < 4$

A baseball team had \$1,000 to spend on supplies. The team spent \$185 on a new bat. New baseballs cost \$4 each. The inequality  $185 + 4b \leq 1,000$  can be used to determine the number of new baseballs ( $b$ ) that the team can purchase. Which statement about the number of new baseballs that can be purchased is true?

- A. The team can purchase 204 new baseballs.
- B. The minimum number of new baseballs that can be purchased is 185.
- C. The maximum number of new baseballs that can be purchased is 185.
- D. The team can purchase 185 new baseballs, but this number is neither the maximum nor the minimum.

The solution set of an inequality is graphed on the number line below.



The graph shows the solution set of which inequality?

- A.  $2x + 5 < -1$
- B.  $2x + 5 \leq -1$
- C.  $2x + 5 > -1$
- D.  $2x + 5 \geq -1$

Tyreke always leaves a tip of between 8% and 20% for the server when he pays for his dinner. This can be represented by the system of inequalities shown below, where  $y$  is the amount of tip and  $x$  is the cost of dinner.

$$y > 0.08x$$

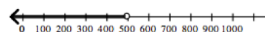
$$y < 0.2x$$

Which of the following is a true statement?

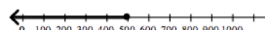
- A. When the cost of dinner ( $x$ ) is \$10, the amount of tip ( $y$ ) must be between \$2 and \$8.
- B. When the cost of dinner ( $x$ ) is \$15, the amount of tip ( $y$ ) must be between \$1.20 and \$3.00.
- C. When the amount of tip ( $y$ ) is \$3, the cost of dinner ( $x$ ) must be between \$11 and \$23.
- D. When the amount of tip ( $y$ ) is \$2.40, the cost of dinner ( $x$ ) must be between \$3 and \$6.

58. To join the school swim team, swimmers must be able to swim at least 500 yards without stopping. Let  $n$  represent the number of yards a swimmer can swim without stopping. Write an inequality describing which values of  $n$  will result in a swimmer making the team. Graph the solution.

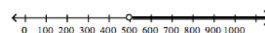
A.)  $n < 500$



B.)  $n \leq 500$



C.)  $n > 500$



D.)  $n \geq 500$



Consider this pair of inequalities.

$$4x - 6 < 42 \text{ and } x + 2 \geq 1$$

Which value is a solution to both inequalities?

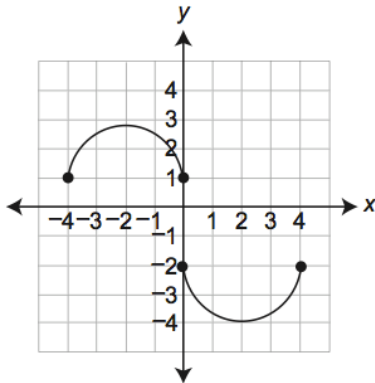
- A -5
- B -1
- C 12
- D 13

**Practice Algebra 1 Keystone Exam**  
**MODULE 2**  
**LINEAR FUNCTIONS**

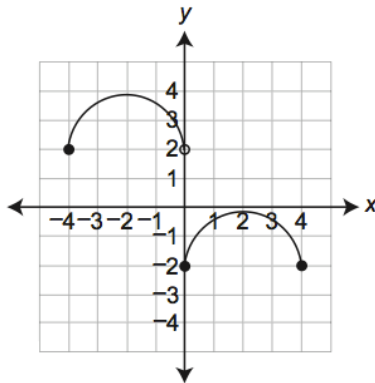
Name \_\_\_\_\_

Which graph shows  $y$  as a function of  $x$ ?

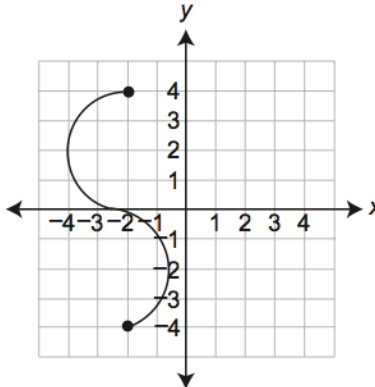
A.



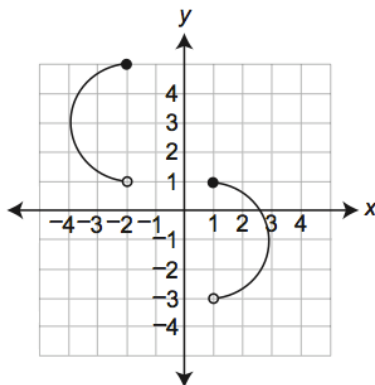
B.



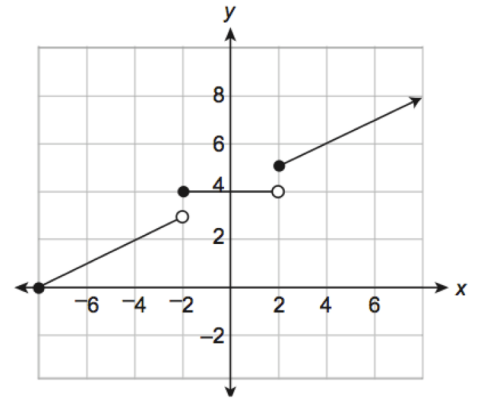
C.



D.



The graph of a function is shown below.



Which value is **not** in the range of the function?

- A. 0
- B. 3
- C. 4
- D. 5

A pizza restaurant charges for pizzas and adds a delivery fee. The cost ( $c$ ), in dollars, to have any number of pizzas ( $p$ ) delivered to a home is described by the function  $c = 8p + 3$ . Which statement is true?

- A. The cost of 8 pizzas is \$11.
- B. The cost of 3 pizzas is \$14.
- C. Each pizza costs \$8 and the delivery fee is \$3.
- D. Each pizza costs \$3 and the delivery fee is \$8.

The table below shows values of  $y$  as a function of  $x$ .

$x$	$y$
2	10
6	25
14	55
26	100
34	130

Which linear equation best describes the relationship between  $x$  and  $y$ ?

- A.  $y = 2.5x + 5$
- B.  $y = 3.75x + 2.5$
- C.  $y = 4x + 1$
- D.  $y = 5x$

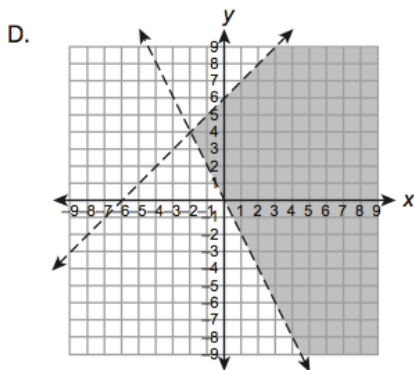
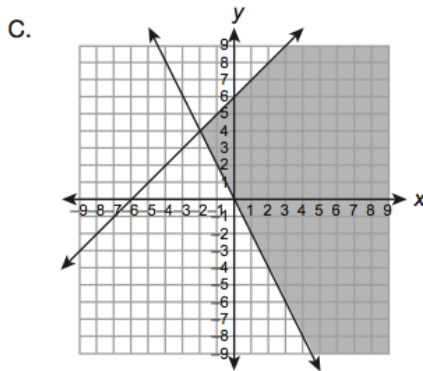
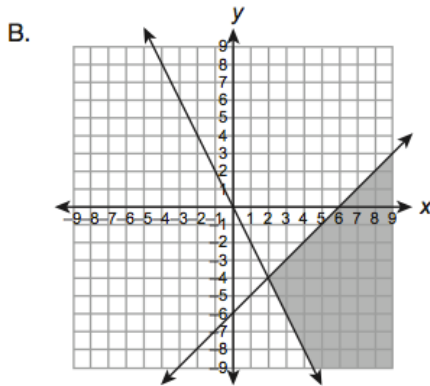
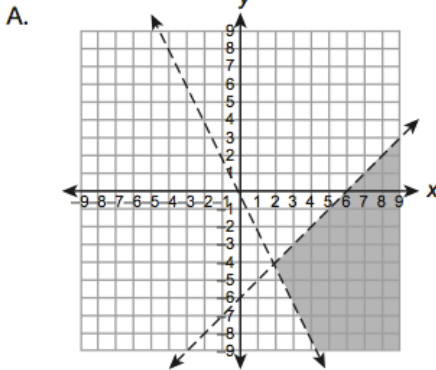


A system of inequalities is shown below.

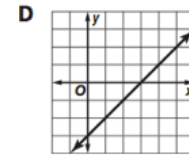
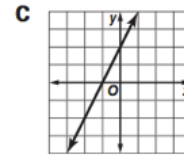
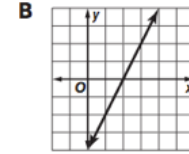
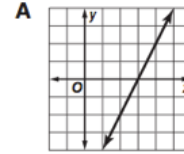
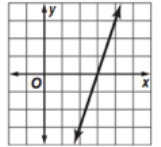
$$y < x - 6$$

$$y > -2x$$

Which graph shows the solution set of the system of inequalities?



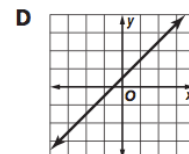
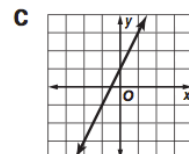
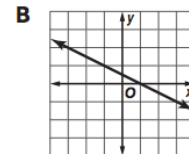
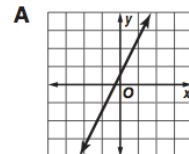
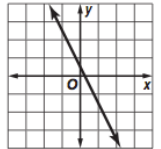
To the right is a graph with a slope of 3 that intercepts the x-axis at (3, 0). Which of these is a graph with a slope of 2 that intercepts the x-axis at (2, 0)?



Which situation can be represented by a linear function?

- A the distance traveled by an accelerating rocket
- B the population of a town that is doubling in size every five years
- C the temperature of water in the ocean over a 1-year period
- D the cost of piano lessons at \$20 per hour

To the right is the graph of  $y = -mx + \frac{1}{2}$ . Which of these is the graph of  $y = mx + \frac{1}{2}$ ?



What equation results when the graph of  $y = 2x + 2$  is changed to have a slope of 4 and a y-intercept of 3?

- A  $y = 4x + 3y$
- B  $3y = 4x + 1$
- C  $y = 3x + 4$
- D  $y = 4x + 3$

Which set of data is nonlinear?

A. 

x	-1	0	1	2
y	1	10	100	1,000

B. 

x	-1	0	1	2
y	0	0	0	0

C. 

x	-1	0	1	2
y	-1	0	1	2

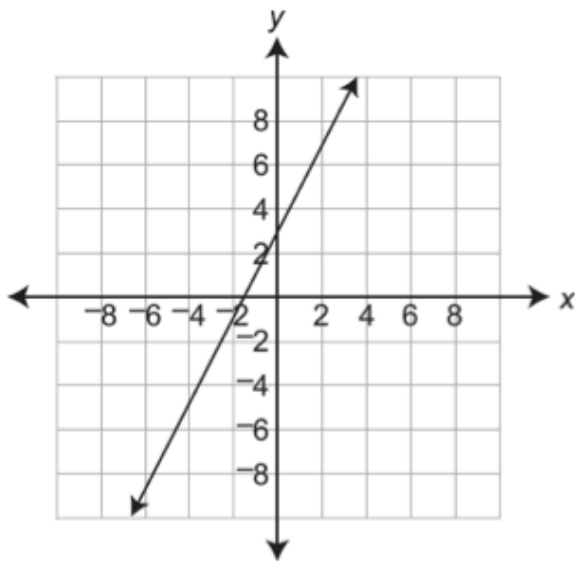
D. 

x	-1	0	1	2
y	54	53	52	51

Which of these is the equation of the line through (2, 3) with slope  $\frac{3}{2}$ ?

- A  $y = \frac{3}{2}x + 3$
- B  $y = \frac{3}{2}x$
- C  $y = \frac{3}{2}x + \frac{2}{3}$
- D  $y = 2x + 3$

A graph of a linear equation is shown below.



Which equation describes the graph?

- A.  $y = 0.5x - 1.5$
- B.  $y = 0.5x + 3$
- C.  $y = 2x - 1.5$
- D.  $y = 2x + 3$

Jeff's restaurant sells hamburgers. The amount charged for a hamburger ( $h$ ) is based on the cost for a plain hamburger plus an additional charge for each topping ( $t$ ) as shown in the equation below.

$$h = 0.60t + 5$$

What does the number 0.60 represent in the equation?

- A. the number of toppings
- B. the cost of a plain hamburger
- C. the additional cost for each topping
- D. the cost of a hamburger with 1 topping

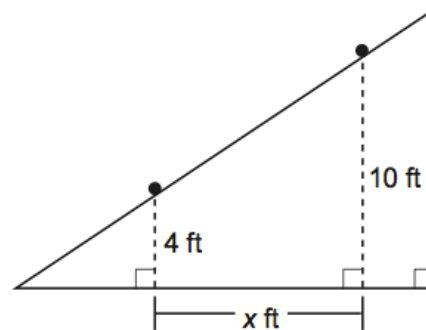
A juice machine dispenses the same amount of juice into a cup each time the machine is used. The equation below describes the relationship between the number of cups ( $x$ ) into which juice is dispensed and the gallons of juice ( $y$ ) remaining in the machine.

$$x + 12y = 180$$

How many gallons of juice are in the machine when it is full?

- A. 12
- B. 15
- C. 168
- D. 180

A ball rolls down a ramp with a slope of  $\frac{2}{3}$ . At one point the ball is 10 feet high, and at another point the ball is 4 feet high, as shown in the diagram below.



What is the horizontal distance ( $x$ ), in feet, the ball traveled as it rolled down the ramp from 10 feet high to 4 feet high?

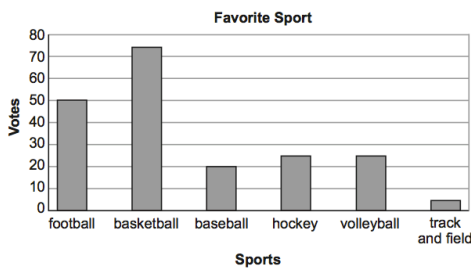
- A. 6
- B. 9
- C. 14
- D. 15

## MODULE 2 DATA ANALYSIS

The daily high temperatures, in degrees Fahrenheit ( $^{\circ}\text{F}$ ), of a town are recorded for one year. The median high temperature is  $62^{\circ}\text{F}$ . The interquartile range of high temperatures is 32. Which is **most likely** to be true?

- A. Approximately 25% of the days had a high temperature less than  $30^{\circ}\text{F}$ .
- B. Approximately 25% of the days had a high temperature greater than  $62^{\circ}\text{F}$ .
- C. Approximately 50% of the days had a high temperature greater than  $62^{\circ}\text{F}$ .
- D. Approximately 75% of the days had a high temperature less than  $94^{\circ}\text{F}$ .

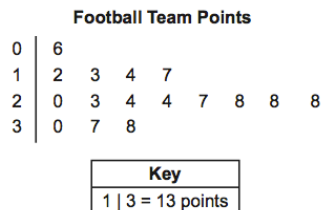
Vy asked 200 students to select their favorite sport and then recorded the results in the bar graph below.



Vy will ask another 80 students to select their favorite sport. Based on the information in the bar graph, how many more students of the next 80 asked will select basketball rather than football as their favorite sport?

- A. 10
- B. 20
- C. 25
- D. 30

The points scored by a football team are shown in the stem-and-leaf plot below.



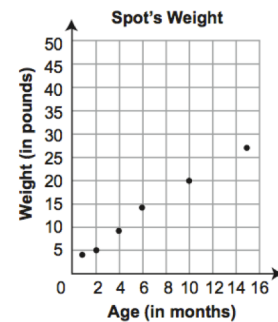
What was the median number of points scored by the football team?

- A. 24
- B. 27
- C. 28
- D. 32

A number cube with sides labeled 1 through 6 is rolled two times, and the sum of the numbers that end face up is calculated. What is the probability that the sum of the numbers is 3?

- A.  $\frac{1}{18}$
- B.  $\frac{1}{12}$
- C.  $\frac{1}{9}$
- D.  $\frac{1}{2}$

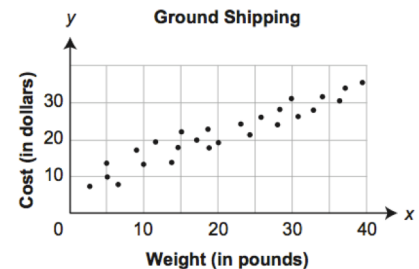
John recorded the weight of his dog Spot at different ages as shown in the scatter plot below.



Based on the line of best fit, what will be Spot's weight after 18 months?

- A. 27 pounds
- B. 32 pounds
- C. 36 pounds
- D. 50 pounds

The scatter plot below shows the cost ( $y$ ) of ground shipping packages from Harrisburg, PA, to Minneapolis, MN, based on the package weight ( $x$ ).



Which equation **best** describes the line of best fit?

- A.  $y = 0.37x + 1.57$
- B.  $y = 0.37x + 10.11$
- C.  $y = 0.68x + 2.32$
- D.  $y = 0.68x + 6.61$