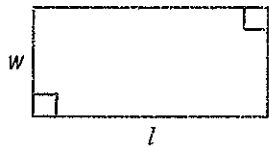
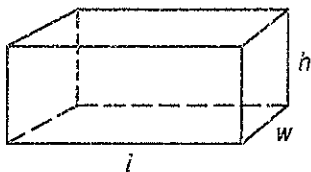


**FORMULA SHEET**

Formulas that you may need to work questions in this document are found below.  
 You may use calculator  $\pi$  or the number 3.14.



$A = lw$



$V = lwh$

**Linear Equations**

**Slope:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$

**Point-Slope Formula:**  $(y - y_1) = m(x - x_1)$

**Slope-Intercept Formula:**  $y = mx + b$

**Standard Equation of a Line:**  $Ax + By = C$

**Arithmetic Properties**

**Additive Inverse:**  $a + (-a) = 0$

**Multiplicative Inverse:**  $a \cdot \frac{1}{a} = 1$

**Commutative Property:**  $a + b = b + a$   
 $a \cdot b = b \cdot a$

**Associative Property:**  $(a + b) + c = a + (b + c)$   
 $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

**Identity Property:**  $a + 0 = a$   
 $a \cdot 1 = a$

**Distributive Property:**  $a \cdot (b + c) = a \cdot b + a \cdot c$

**Multiplicative Property of Zero:**  $a \cdot 0 = 0$

**Additive Property of Equality:**  
 If  $a = b$ , then  $a + c = b + c$

**Multiplicative Property of Equality:**  
 If  $a = b$ , then  $a \cdot c = b \cdot c$



# Algebra 1

## Practice Keystone Exam

1. 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.  $3(x-2)^2 \geq 3x^2 - 2$

2. An expression is shown to the right:  $2\sqrt{51}x$

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

- a. 5
- b. 25
- c. 50
- d. 100

3. 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.  $9,000x^4y^5$

4. Simplify:  $2(2\sqrt{4})^{-2}$

- a.  $\frac{1}{8}$
- b.  $\frac{1}{4}$
- c. 16
- d. 32

5. 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?
- \$300,000
  - \$400,000
  - \$500,000
  - \$600,000

6.  $(x+3)(2x^2+5x+2)$   
The above expression simplifies to
- $2x^3+11x^2+17x+6$
  - $2x^2+6x+5$
  - $9x^2+21x+6$
  - $2x^3+5x^2+6$

7. When the expression  $x^2 - 3x - 18$  is factored completely, which is one of its factors?
- $(x-2)$
  - $(x-3)$
  - $(x-6)$
  - $(x-9)$

8. Simplify:  $\frac{-3x^3+9x^2+30x}{-3x^3-18x^2-24x}$  ;  $x \neq -4, -2, 0$
- $\frac{-1}{2}x^2 - \frac{5}{4}x$
  - $x^3 - \frac{1}{2}x^2 - \frac{5}{4}x$
  - $\frac{x+5}{x-4}$
  - $\frac{x-5}{x+4}$

9. Jenny has a job that pays her \$8 per hour plus tips ( $t$ ). Jenny worked for 4 hours on Monday and made \$65 in all. Which equation could be used to find  $t$ , the amount Jenny made in tips?
- $65 = 4t + 8$
  - $65 = 8t \div 4$
  - $65 = 8t + 4$
  - $65 = 8(4) + t$

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

$$-5(3x + 7) = 10$$

$$-15x + -35 = 10$$

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

- Jamie add -5 and  $3x$  to eliminate the parentheses. This procedure is justified by the associative property.
  - Jamie added -5 and  $3x$  to eliminate the parentheses. The procedure is justified by the distributive property.
  - Jamie multiplied  $3x$  and 7 by -5 to eliminate the parentheses. The procedure is justified by the associative property.
  - Jamie multiplied  $3x$  and 7 by -5 to eliminate the parentheses. The procedure is justified by the distributive property.
11. 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 the solution to the equation. What does the solution represent?

- Hamburgers cost 2 times as much as hot dogs
- Francisco purchased 2 hot dogs and 1 hamburger
- Hot dogs cost \$2 each and hamburgers cost \$1 each
- Francisco spent \$2 on a hot dogs and \$1 on a hamburgers

12. 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  $x$ , in minutes Anna spent running?

- a. 10
- b. 20
- c. 30
- d. 40

13. 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 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.

14. A compound inequality is shown to the right.  $5 < 2 - 3y < 14$

What is the solution set of the compound inequality?

- a.  $-4 > y > -1$
- b.  $-4 < y < -1$
- c.  $1 > y > 4$
- d.  $1 < y < 4$

15. Mike 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 the dinner.

$$y > 0.08x$$

$$y < 0.2x$$

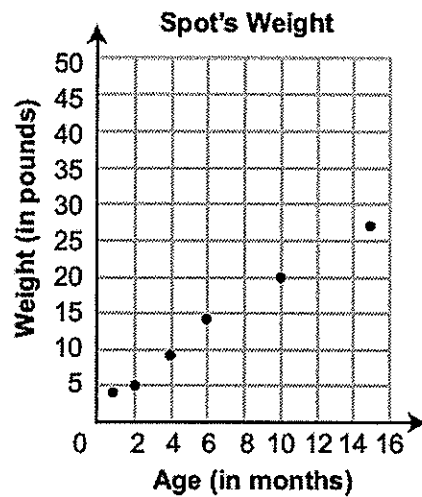
Which of the following is a true statement?

- When the cost of the dinner ( $x$ ) is \$10, the amount of the tip ( $y$ ) must be between \$2 and \$8.
  - When the cost of the dinner ( $x$ ) is \$15, the amount of the tip ( $y$ ) must be between \$1.20 and \$3.00.
  - When the cost of the tip ( $y$ ) is \$3, the amount of the dinner ( $x$ ) must be between \$11 and \$23.
  - When the cost of the tip ( $y$ ) is \$2.40, the amount of the dinner ( $x$ ) must be between \$3 and \$6.
16. Tim's scores for the first 5 times he played a video game are listed below.
- 4,526   4,599   4,672   4,745   4,818
- Tim's scores follow a pattern. Which expression can be used to determine his score after he played the video game  $n$  times?
- $73n + 4,453$
  - $73(n + 4,453)$
  - $4,453n + 73$
  - $4,526n$

17. 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?
- The cost of 8 pizzas is \$11
  - The cost of 3 pizzas is \$14
  - Each pizza costs \$8 and the delivery fee is \$3
  - Each pizza costs \$3 and the delivery fee is \$8.

18.

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

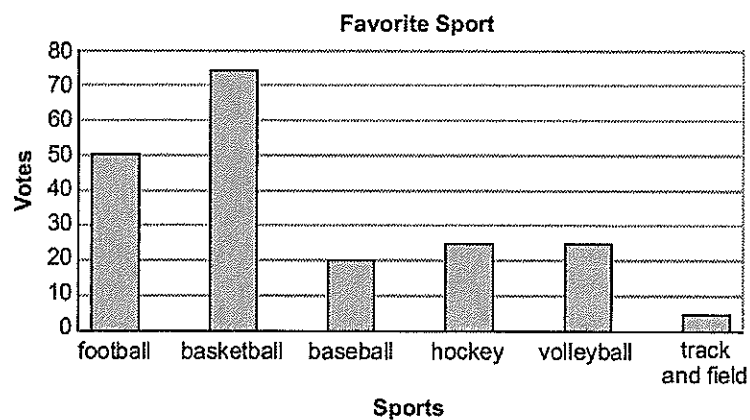


Based on the line of best fit, what will be Spot's weight after 18 months?

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

19.

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



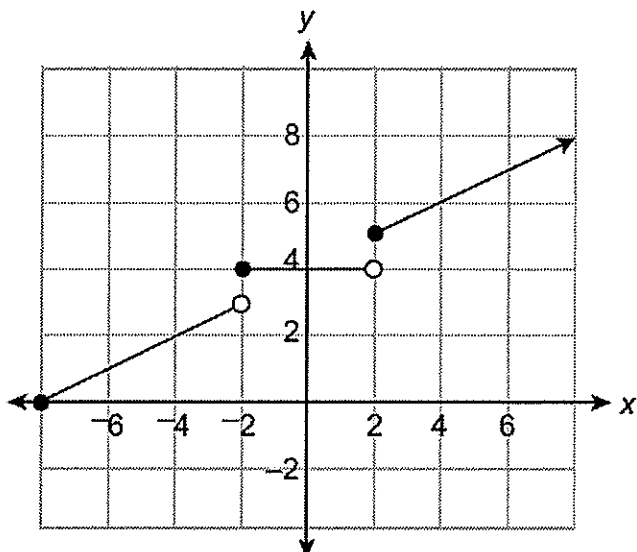
Vy will ask another 80 students to select their favorite sport. Based on the information in the bar graph, how many more students of the next 80 asked will select basketball rather than football as their favorite sport?

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



20.

The graph of a function is shown below.

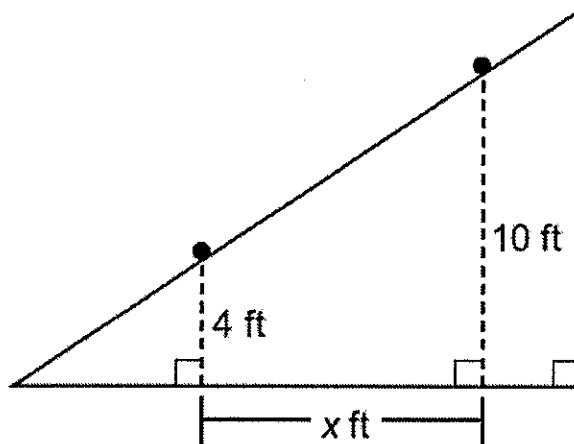


Which value is not in the range of the function?

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

21.

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.

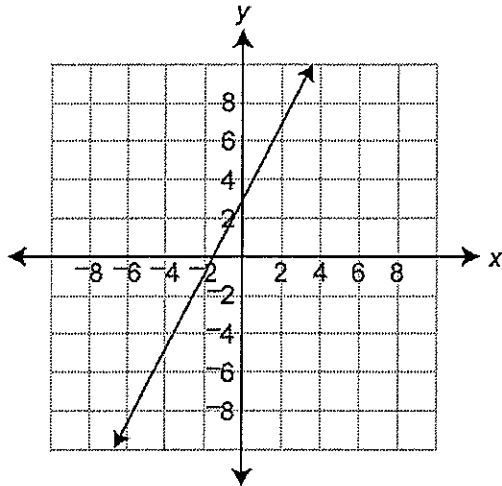


What is the horizontal distance ( $x$ ), in feet, the ball traveled as it rolled down the ramp from 10 feet high to 4 feet high?

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

22.

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.  $y = 2x + 3$

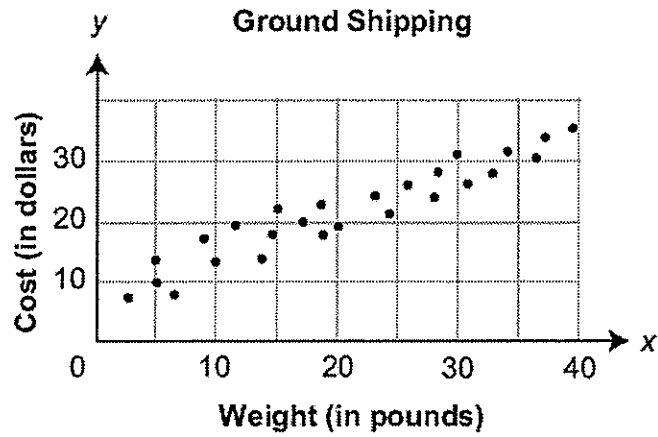
23.

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  $94^{\circ}\text{F}$ .

24.

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.  $y = 0.68x + 6.61$

## CONSTRUCTED-RESPONSE QUESTIONS

A1.1.3

1. Veronica is trying to decide how much time to spend on each of her homework assignments.
  - It takes 6 minutes to solve each math problem.
  - It takes 20 minutes to read each chapter from her novel for English class.
  - She has **no more** than 4 hours to work on her homework.
  - She wants to solve **at least** 4 math problems for each English chapter she reads.

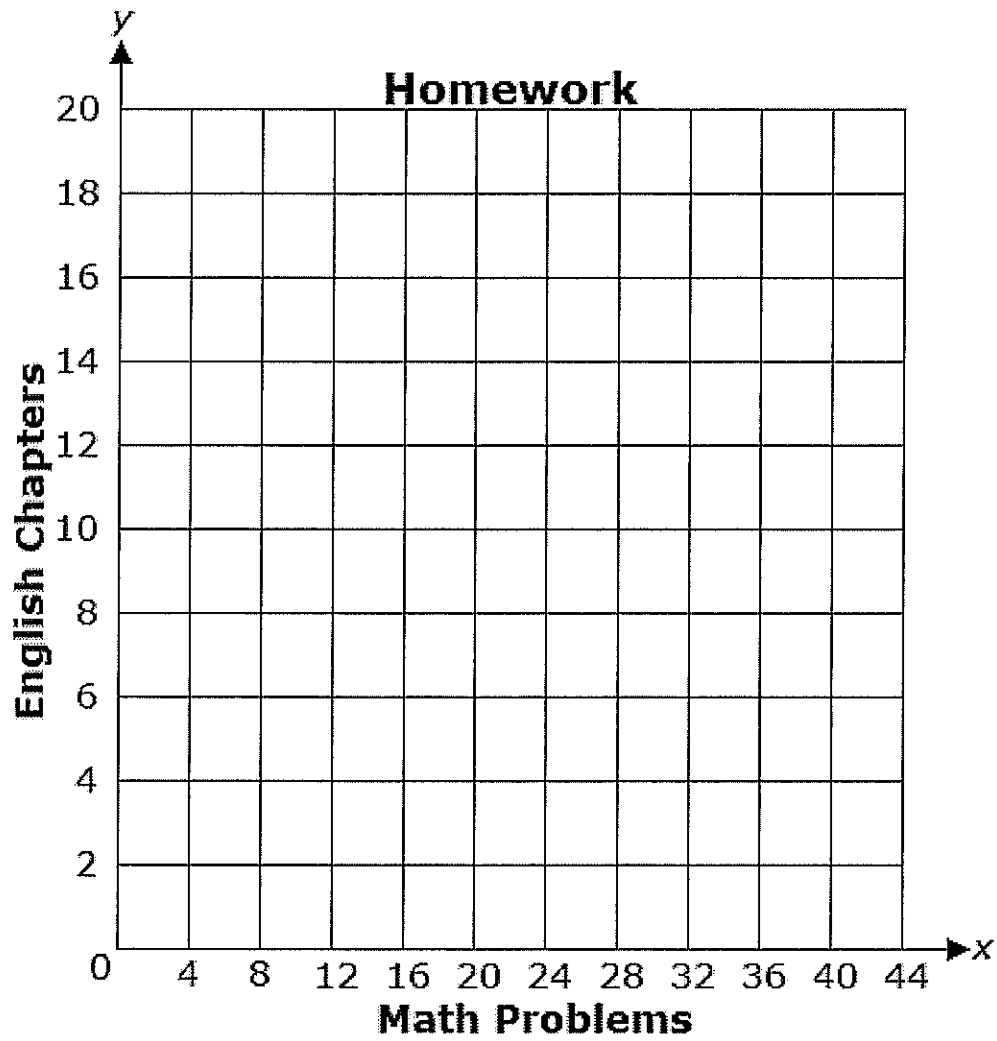
The information given can be modeled with a system of inequalities, where  $x$  is the number of math problems she can solve, and  $y$  is the number of chapters she can read.

- A.** Write the two inequalities that form the system of inequalities which models the information above.

inequalities: \_\_\_\_\_

- B.** Suppose Veronica decides to read 4 chapters from her English novel. Use the inequalities found in **part A** to find the minimum amount of time she will spend on her homework. Show all your work. Explain why you did each step.

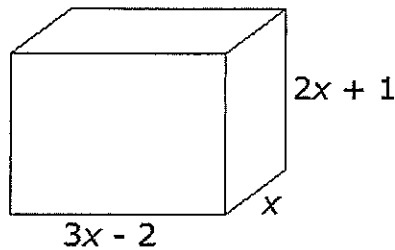
- C. Graph the solution set of the inequalities from **part A** below. Shade the area that represents the solution set.



## CONSTRUCTED-RESPONSE QUESTIONS

A1.1.1

2. Alena is packing a box that has a height of one inch more than twice the width and a length of two inches less than three times the width, as shown in the diagram below.



- A.** Write a polynomial expression, in simplified form, that represents the volume of the box.

Alena packs another box. This box has a square base with an area of  $9x^2 - 6x + 1$  square inches.

- B.** Write an expression to represent one side length of the base.

Alena has a third box whose height is the same as the first box, but whose volume is  $6x^3 + 15x^2 + 6x$  cubic inches.

- C.** Determine how much wider and longer this box is than the first box. Assume that the length of the box has a larger coefficient than the width. Show all your work. Explain why you did each step.



## CONSTRUCTED-RESPONSE QUESTIONS

A1.1.2

3. Carpet Company A charges a flat installation fee of \$75 plus the price per square foot of carpet. The company charges a total of \$979.80 to install 624 square feet of carpet.

**A.** Write an equation using  $x$  and  $y$  to find the total installation price based on any square footage of carpet.

equation: \_\_\_\_\_

Carpet Company B uses the equation  $y = 1.25x + 90$  to find the square footage of carpet needed for a project.

**B.** Identify the property used in the first step when finding the square footage of carpet needed for a project with a total cost of \$1,095.

property: \_\_\_\_\_

**C.** Determine which carpet company has the lowest total installation price for a project that is 72 square feet. Show all your work. Explain why you did each step.