Systems of Equations

Non-Calculator: Multiple Choice

$$3x + 2y = 6$$
$$2x - y = 4$$

1. If (x, y) is the solution to the systems of equations above, what is the value of $x + y$?
   A) 0
   B) 1
   C) 2
   D) 4

$$y + 7x = 25$$
$$6x + y = 23$$

2. If (x, y) is the solution to the systems of equations above, what is the value of x?
   A) 1
   B) 2
   C) 3
   D) 4

$$3x - 2y = 8$$
$$-4x + 3y = -2$$

3. If (x, y) is the solution to the systems of equations above, what is the value of $7x - y$?
   A) 20
   B) 114
   C) 162
   D) 46

$$y \leq 3x + 1$$
$$x - y \geq -3$$

4. Which of the following ordered pairs satisfies the inequalities above?
   A) $(1, 4)$
   B) $(-1, 4)$
   C) $(-3, 8)$
   D) $(-2, -1)$

$$y \geq 5x + 7$$
$$x + y \leq 1$$

5. Which of the following ordered pairs satisfies the above inequalities?
   A) $(4,5)$
   B) $(5,6)$
   C) $(1,-2)$
   D) $(-2,3)$

$$2x + 2y > 13$$
$$y \geq 4x - 8$$

6. Which of the following ordered pairs satisfies the above inequalities?
   A) $(1,2)$
   B) $(3,4)$
   C) $(-4,5)$
   D) $(6,-7)$

$$|4x + 14| > 30$$

7. What is a possible value of x that satisfies the above inequality?
   A) 4
   B) 1
   C) 7
   D) -4

8. If $-2x + 5 \leq 10$, then:
   A) $x \geq \frac{5}{2}$
   B) $x \geq 5$
   C) $x \leq -\frac{5}{2}$
   D) $x \geq -\frac{5}{2}$

9. Each morning, John jogs at 6 miles per hour and bikes at 12 miles per hour. His goal is to jog and ride his bike a total of at least 9 miles in no more than one hour. If John jogs for j hours and rides his bike b hours, which of the following systems of inequalities represents John's goal?

A) $\frac{j}{6} + \frac{b}{12} < 1;\ j + b \geq 1$

B) $\frac{j}{6} + \frac{b}{12} \geq 1;\ j + b \leq 9$

C) $6j + 12b \geq 9;\ j + b \leq 1$

D) $6j + 12b \leq 1;\ j + b \geq 9$

10. A spiritual healer charges a flat fee for a spiritual cleanse, with an additional fee for each chakra she heals. When Amelia has her spiritual cleanse, she also has three of her chakras healed and pays $140.00. John has all seven of his chakras healed during his spiritual cleanse, paying $220. Which of the following equations could be used to solve for the cost of healing one chakra?

A) $(140 - 3c) + 7c = 220$
B) $(140 - 7c) + 3c = 220$
C) $(140 + 3c) + 7c = 140$
D) $(140 + 3c) - 7c = 220$

11. If $7x = 56$ and $kx = 9$, what is the value of k?

A) $\frac{8}{9}$

B) $\frac{9}{8}$

C) 8

D) 9

12. If $4x + 2y = 18$ and $2y - 2z = 8$, what is the value of $4x + 2z$?

A) 5
B) 10
C) 12
D) Cannot be determined from the given information.

13. In a forest, there are 3 times as many raccoons, R, as there are bears, B, and twice as many deer, D, as raccoons and bears combined. Which of the following systems of equations represent the number of each animal in the forest?

A) $(R + B) = 2D$
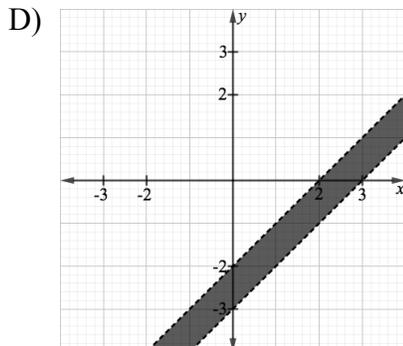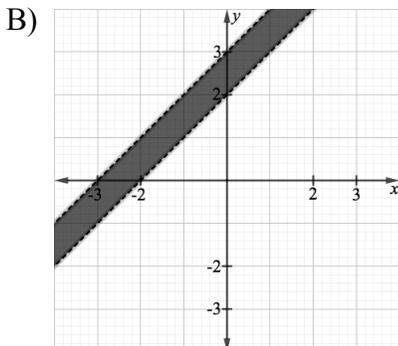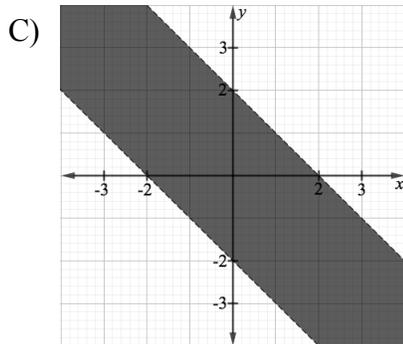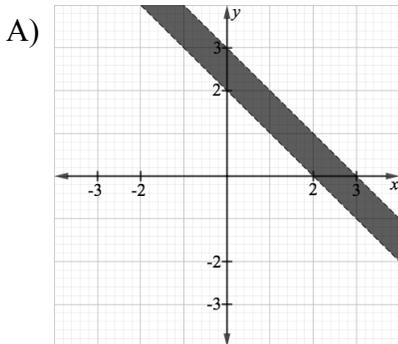 $R = 3B$

B) $(R + B) = \frac{1}{2}D$
   $R = 3B$

C) $(R - D) = 2B$
   $2D - R = 3B$

D) $(R + B) = \frac{1}{2}D$
   $3R = B$

14. Based on the information in Question 13, if there are 48 animals in total, how many bears are there?
A) 2
B) 4
C) 8
D) 16

15. Which of the following is the graph of the region $2 < x + y < 3$?

A)

C)

B)

D)

16. If $-1 < x < 1$, which of the following could be true?

      I. $x^2 < x$
     II. $16x^2 - 1 = 0$
    III. $|x^2 - 1| > 1$
    IV. $x^2 < 2x$

A) I only
B) I, II, III
C) I, II, IV
D) II, IV

Non-Calculator: Grid In

17. A Madonna-themed spa is having a Black Friday event and offering two treatments at a discounted rate: 'Papa Don't Bleach' (an all-natural hair lightening treatment) for $50 and 'Espresso Yourself' (a caffeine face mask) for $35. If the spa performs 90 treatments that day and makes $4050, how many 'Papa Don't Bleach' treatments did they sell?

18. Mikayla is trying to round out her workout routine. She plans to do yoga, ride her bike, and surf for a total of no less than 8 hours per week. If Mikayla spends twice as many hours on her surfboard as she does riding her bike, and spends an equal amount of time doing yoga and riding her bike, what is the minimum number of hours that Mikayla should surf each week to meet her 8-hour exercise goal?

19. The cost of manufacturing x crystal balls is $1800 + 10x$. Each crystal ball sells for \$25.00. What is the minimum amount of crystal balls that need to be sold to cover manufacturing costs?

20. What is the maximum value of $f(x, y)$ given the following system of inequalities?

$$y \geq 4$$
$$2 \leq x \leq 6$$
$$3x + 2 \geq y - 1$$
$$f(x, y) = 4x + 2y + 3$$

Calculator: Multiple Choice

21. Sarah is selling bracelets and earrings to earn money for a school trip. The bracelets cost \$2 and the earrings cost \$3. She needs to make at least \$500. Which inequality represents the income from Sarah's sales?
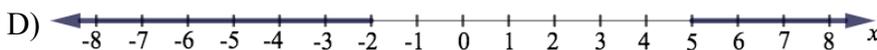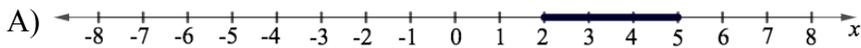
A) $2b + 3e < 500$
B) $2b - 3e > 500$
C) $2b + 3e \geq 500$
D) $2b - 3e \leq 500$

22. Using the correct answer above, if Sarah sells 70 bracelets, how many earrings must she sell to make enough money for the trip?
A) 15
B) 20
C) 120
D) 200

23. George is a bicycle mechanic at a mountain bike shop. He is placing an order for bike parts and needs to order enough suspension forks to build at least 330 bikes for the summer season. Hard-tail bikes, H, have only front suspension, which uses 1 fork per bike, and full suspension bikes, F, use a dual fork system with 1 suspension fork in the front of the bike and one in the back. George wants to build at least twice as many full suspension bikes as hardtails. Which of the following systems of inequalities represents this scenario?
    A) $H + F \geq 330$ and $H \geq 2F$
    B) $H + F \leq 330$ and $F \geq 2H$
    C) $H + F \geq 330$ and $F \geq 2H$
    D) $H + F \leq 330$ and $H \geq 2F$

24. Which number line represents the inequality:
    $|4x - 6| \leq 14$?

A)

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 x

B)

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 x

C)

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 x

D)

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 x

25. For what value of n is $|n - 2| + 2 = 0$?
    A) -2
    B) 0
    C) 2
    D) There is no such value of n.

26. If $3 \leq x \leq 9$ and $12 \leq y \leq 24$, which inequality gives the range of values possible for $\frac{x}{y}$?

A) $\frac{1}{8} \leq \frac{x}{y} \leq \frac{3}{4}$

B) $\frac{3}{8} \leq \frac{x}{y} \leq \frac{3}{4}$

C) $\frac{1}{4} \leq \frac{x}{y} \leq \frac{3}{4}$

D) $\frac{1}{8} \leq \frac{x}{y} \leq \frac{3}{8}$

27. Karen from finance is estimating how long it will take her to do her tax returns. She estimates it will take x hours to complete the task, where $x > 50$. The goal is for this estimate to be within 5 hours of the time it will actually take to complete the project. If Karen meets this goal and finishes the project in y hours, which inequalities represent the relationship between the estimated and actual completed time?

A) $x - y > 5$

B) $y > x + 5$

C) $-5 < x + y < 5$

D) $-5 < y - x < 5$

28. Gaz is carrying in his shopping and wants to make as few trips as possible. Each large bag (x) in his trunk weights 10 kilograms, while each small bag (y) weighs 7 kilograms. Gaz can either carry 10 bags or a weight of 120 kilograms. Which of the following systems of inequalities best represents this relationship?

A) $10x - 7y \leq 110$

$\quad x + y \leq 10$

B) $\frac{x}{10} + \frac{7}{y} \leq 120$

$\quad x + y \leq 10$

C) $10x + 7y \leq 10$

$\quad x + y \leq 120$

D) $10x + 7y \leq 120$

$\quad x + y \leq 10$

Calculator: Grid In

29. After drinking too many holiday beverages at Starbucks, Katrina experiences heart palpitations and heads to the Urgent Care. Her doctor advises her to limit her caffeine consumption to no more than 300 milligrams of caffeine per day. A London Fog has 50 milligrams of caffeine and a Spiced Chai Tea has 40 milligrams of caffeine. Katrina would like to drink at least twice as many London Fogs as Spiced Chai Teas each day. In order to follow doctor's orders and still maintain her preferred holiday beverage ratio, what is the maximum number of Spiced Chai Teas Katrina can drink? Round to the nearest whole number.

30. In the xy-plane, if a point with coordinates (p, q) lies in the solution set of the system of inequalities below, what is the maximum value of q?

$$y \leq 2400 - 12x$$
$$y \leq 6x$$