Choose the term from above to complete each sentence.

1. A feasible region that is open and can go on forever is called_____.

   ANSWER:
   unbounded

2. To _____means to seek the best price or profit using linear programming.

   ANSWER:
   optimize

3. A matrix that contains the constants in a system of equations is called a(n) _____.

   ANSWER:
   constant matrix

4. A matrix can be multiplied by a constant called a(n) _____.

   ANSWER:
   scalar

5. The _____ of a matrix with 4 rows and 3 columns are 4×3.

   ANSWER:
   dimensions

6. A system of equations is _____if it has at least one solution.

   ANSWER:
   consistent

7. The _____ matrix is a square matrix that, when multiplied by another matrix, equals that same matrix.

   ANSWER:
   identity

8. The _____is the point at which the income equals the cost.

   ANSWER:
   break-even point

9. A system of equations is _____ if it has no solutions.

   ANSWER:
   inconsistent

10. If the product of two matrices is the identity matrix, they are _____.

    ANSWER:
    inverses

Solve each system of equations by graphing.

11. $3x + 4y = 8$
    $x - 3y = -6$

    ANSWER:
    (0, 2)

12. $x + \dfrac{8}{3}y = 12$
    $\dfrac{1}{2}x + \dfrac{4}{3}y = 6$

    ANSWER:
    infinitely many solutions

13. $y - 3x = 13$
    $y = \dfrac{1}{3}x + 5$

    ANSWER:
    (−3, 4)

14. $6x - 14y = 5$
    $3x - 7y = 5$

    ANSWER:
    no solution

15. **LAWN CARE** André and Paul each mow lawns. André charges a $30 service fee and $10 per hour. Paul charges a $10 service fee and $15 per hour. After how many hours will André and Paul charge the same amount?

    ANSWER:
    4 hours

Solve each system of equations by using either substitution or elimination.

16.
$$x + y = 6$$
$$3x - 2y = -2$$

ANSWER:
$(2, 4)$

17.
$$5x - 2y = 4$$
$$-2y + x = 12$$

ANSWER:
$(-2, -7)$

18.
$$x + y = 3.5$$
$$x - y = 7$$

ANSWER:
$(5.25, -1.75)$
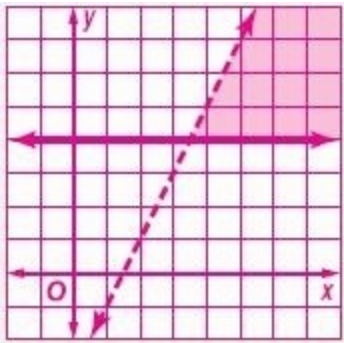
19.
$$3y - 5x = 0$$
$$2y - 4x = -2$$

ANSWER:
$(3, 5)$

20. **SCHOOL SUPPLIES** At an office supply store, Emilio bought 3 notebooks and 5 pens for $13.75. If a notebook costs $1.25 more than a pen, how much does a notebook cost? How much does a pen cost?

ANSWER:
notebook: $2.50; pen: $1.25

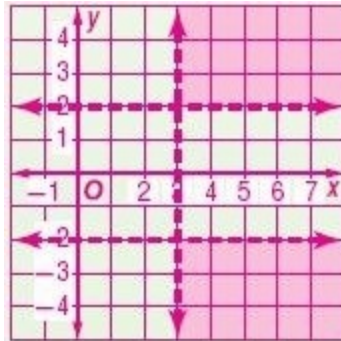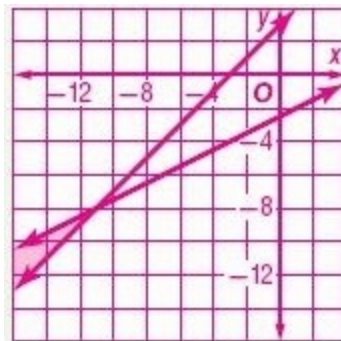**Solve each system of inequalities by graphing.**

21.
$$y < 2x - 3$$
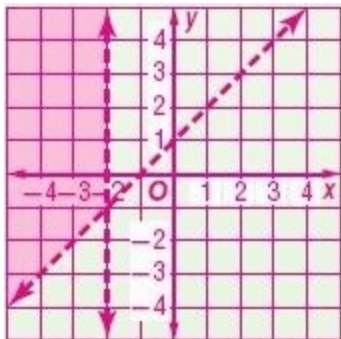$$y \geq 4$$

ANSWER:

22.
$$|y| > 2$$
$$x > 3$$

ANSWER:

23.
$$y \geq x + 3$$
$$2y \leq x - 5$$

ANSWER:

24.
$$y > x + 1$$
$$x < -2$$

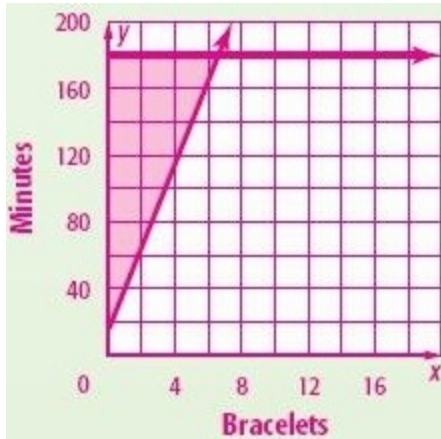*ANSWER:*

25. **JEWELRY** Payton makes jewelry to sell at her mother's clothing store. She spends no more than 3 hours making jewelry on Saturdays. It takes her 15 minutes to set up her supplies and 25 minutes to make each bracelet. Draw a graph that represents this.

ANSWER:

26. **FLOWERS** A florist can make a grand arrangement in 18 minutes or a simple arrangement in 10 minutes. The florist makes at least twice as many of the simple arrangements as the grand arrangements. The florist can work only 40 hours per week. The profit on the simple arrangements is $10 and the profit on the grand arrangements is $25. Find the number and type of arrangements that the florist should produce to maximize profit.

ANSWER:

126 simple and 63 grand

27. **MANUFACTURING** A shoe manufacturer makes outdoor and indoor soccer shoes. There is a two-step process for both kinds of shoes. Each pair of outdoor shoes requires 2 hours in step one and 1 hour in step two, and produces a profit of $20. Each pair of indoor shoes requires 1 hour in step one and 3 hours in step 2, and produces a profit of $15. The company has 40 hours of labor available per day for step one and 60 hours available for step two. What is the manufacturer's maximum profit? What is the combination of shoes for this profit?

ANSWER:

$480; 12 outdoor, 16 indoor

Solve each system of equations.

28. $a - 4b + c = 3$
$b - 3c = 10$
$3b - 8c = 24$

ANSWER:

$(-23, -8, -6)$

29. $2x - z = 14$
$3x - y + 5z = 0$
$4x + 2y + 3z = -2$

ANSWER:

$(5, -5, -4)$

30. **AMUSEMENT PARKS** Dustin, Luis, and Marci went to an amusement park. They purchased snacks from the same vendor. Their snacks and how much they paid are listed in the table. How much did each snack cost?

Name	Hot Dogs	Popcorn	Soda	Price
Dustin	1	2	3	$15.25
Luis	2	0	3	$14.00
Marci	1	2	1	$10.25

ANSWER:

hot dog: $3.25; popcorn: $2.25; soda: $2.50

Perform the indicated operations. If the matrix does not exist, write *impossible*.

31. $3\left(\begin{bmatrix} -2 & 0 \\ 6 & 8 \end{bmatrix} + \begin{bmatrix} 1 & 9 \\ -3 & -4 \end{bmatrix}\right)$

ANSWER:

$\begin{bmatrix} -3 & 27 \\ 9 & 12 \end{bmatrix}$

32. $\begin{bmatrix} 2 \\ -6 \end{bmatrix} - \begin{bmatrix} -3 \\ 2 \end{bmatrix} + \begin{bmatrix} 6 \\ 0 \end{bmatrix}$

ANSWER:

$\begin{bmatrix} 11 \\ -8 \end{bmatrix}$

33. **RETAIL** Current Fashions buys shirts, jeans and shoes from a manufacturer, marks them up, and then sells them. The table shows the purchase price and the selling price.

Item	Purchase Price	Selling Price
shirts	$15	$35
jeans	$25	$55
shoes	$30	$85

a. Write a matrix for the purchase price.
b. Write a matrix for the selling price.
c. Use matrix operations to find the profit on 1 shirt, 1 pair of jeans, and 1 pair of shoes.

ANSWER:

a. buying price: $\begin{bmatrix} 15 \\ 25 \\ 30 \end{bmatrix}$;

b. selling price: $\begin{bmatrix} 35 \\ 55 \\ 85 \end{bmatrix}$;

c. $\begin{bmatrix} 35 \\ 55 \\ 85 \end{bmatrix} - \begin{bmatrix} 15 \\ 25 \\ 30 \end{bmatrix} = \begin{bmatrix} 20 \\ 30 \\ 55 \end{bmatrix}$

Find each product, if possible.

34. $[3 \quad -7] \cdot \begin{bmatrix} 9 \\ -5 \end{bmatrix}$

ANSWER:
[62]

35. $\begin{bmatrix} -3 & 0 & 2 \\ 6 & -1 & 5 \end{bmatrix} \cdot \begin{bmatrix} 8 & -1 \\ -4 & 3 \\ 6 & 7 \end{bmatrix}$

ANSWER:
$\begin{bmatrix} -12 & 17 \\ 82 & 26 \end{bmatrix}$

36. $\begin{bmatrix} 2 & 11 \\ 0 & -3 \\ -6 & 7 \end{bmatrix} \cdot \begin{bmatrix} 0 & 8 & -5 \\ 12 & 0 & 9 \\ 4 & -6 & 7 \end{bmatrix}$

ANSWER:
undefined

37. **GROCERIES** Martin bought 1 gallon of milk, 2 apples, 4 frozen dinners, and 1 box of cereal. The following matrix shows the prices for each item respectively.
[$2.59 $0.49 $5.25 $3.99]
Use matrix multiplication to find the total amount of money Martin spent at the grocery store.

ANSWER:
$28.56

Evaluate each determinant.

38. $\begin{vmatrix} 2 & 4 \\ 7 & -3 \end{vmatrix}$

ANSWER:
−34

39. $\begin{vmatrix} 2 & 3 & -1 \\ 0 & 2 & 4 \\ -2 & 5 & 6 \end{vmatrix}$

ANSWER:
−44

Use Cramer's Rule to solve each system of equations.

40. $3x - y = 0$
$5x + 2y = 22$

ANSWER:
(2, 6)

41. $5x + 2y = 4$
$3x + 4y + 2z = 6$
$7x + 3y + 4z = 29$

ANSWER:
(2, −3, 6)

42. **JEWELRY** Alana paid $98.25 for 3 necklaces and 2 pairs of earrings. Petra paid $133.50 for 2 necklaces and 4 pairs of earrings. Use Cramer's Rule to find out how much 1 necklace costs and how much 1 pair of earrings costs.

    ANSWER:
    necklace: $15.75; pair of earrings: $25.50

Find the inverse of each matrix, if it exists.

43. $\begin{bmatrix} 7 & 4 \\ 3 & 2 \end{bmatrix}$

    ANSWER:
    $\dfrac{1}{2}\begin{bmatrix} 2 & -4 \\ -3 & 7 \end{bmatrix}$

44. $\begin{bmatrix} 2 & 5 \\ -5 & -13 \end{bmatrix}$

    ANSWER:
    $\begin{bmatrix} 13 & 5 \\ -5 & -2 \end{bmatrix}$

45. $\begin{bmatrix} 6 & -3 \\ -8 & 4 \end{bmatrix}$

    ANSWER:
    No inverse exists.

Use a matrix equation to solve each system of equations.

46. $\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \end{bmatrix}$

    ANSWER:
    (8, −12)

47. $\begin{bmatrix} 3 & -1 \\ 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$

    ANSWER:
    (2, 1)

48. **HEALTH FOOD** Heath sells nuts and raisins by the pound. Sonia bought 2 pounds of nuts and 2 pounds of raisins for $23.50. Drew bought 3 pounds of nuts and 1 pound of raisins for $22.25. What is the cost of 1 pound of nuts and 1 pound of raisins?

    ANSWER:
    nuts: $5.25 per pound; raisins: $6.50 per pound