



UNDERSTAND

10. **Communicate Precisely** What is represented by each row in a matrix representing a system of equations?
11. **Error Analysis** Describe and correct the error a student made in solving the system of equations.

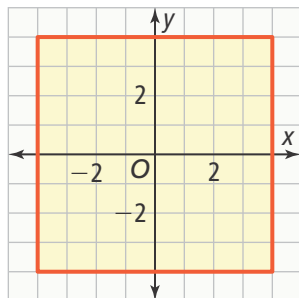
$$\begin{aligned} 2x + 4y = 0 &\Rightarrow 2x + 4y = 0 \\ 3x - 2y = -24 &\Rightarrow 6x - 4y = -24 \end{aligned}$$

$$\begin{aligned} &\Downarrow \\ 8x &= -24 \\ x &= -3 \end{aligned}$$

$$\begin{aligned} &\Downarrow \\ 2(-3) + 4y &= 0 \\ -6 + 4y &= 0 \\ 4y &= 6 \\ y &= \frac{3}{2} \end{aligned}$$



12. **Higher Order Thinking** When solving a system of two equations using matrices, what does it mean graphically when the determinant is equal to zero? (*Hint: The determinant is $(ae - bd)$ for the coefficient matrix in the form $\begin{bmatrix} a & b \\ d & e \end{bmatrix}$.*)
13. **Use Structure** Write a system of equations in three variables with integer solutions. Give the solution. Explain your process.
14. **Reason** Write a system of inequalities for the shaded region.



15. **Mathematical Connections** Find a solution to the following system of equations.

$$\begin{cases} x = 5 - 3y \\ y = -2x \end{cases}$$

What is a matrix that could represent the solution that you found?

PRACTICE

Solve the following systems of equations.

SEE EXAMPLE 1

16. $\begin{cases} x = 2y - 5 \\ 3x - y = 5 \end{cases}$ 17. $\begin{cases} y = 2x + 3 \\ 2y - x = 12 \end{cases}$
18. $\begin{cases} x - 3y = 1 \\ 2x - y = 7 \end{cases}$ 19. $\begin{cases} x + 2y = -4 \\ 3x - y = -5 \end{cases}$

Sketch the graph of the set of all points that solve each system of linear inequalities. SEE EXAMPLE 2

20. $\begin{cases} 0 < x \leq 125 \\ x \geq 2y > 0 \\ 2x + 2y \leq 300 \end{cases}$ 21. $\begin{cases} y + 2x < 10 \\ x - 2y < 8 \\ x > 0 \\ y > 0 \end{cases}$

Solve the following systems of equations.

SEE EXAMPLE 3

22. $\begin{cases} 2x - y - 3z = 20 \\ 3x + y + 6z = 4 \\ x + 2y + 9z = -16 \end{cases}$ 23. $\begin{cases} 2x + 5y - 3z = 14 \\ x - 2y + 4z = -12 \\ -x + 3y - 2z = 13 \end{cases}$

Write the augmented matrix for each system of equations. SEE EXAMPLE 4

24. $\begin{cases} x + y = 2 \\ x - 2y = 17 \end{cases}$ 25. $\begin{cases} y = 2x \\ 4x - y = 9 \end{cases}$
26. $\begin{cases} 10a - 5b = 3 \\ a = -\frac{1}{2}b \end{cases}$ 27. $\begin{cases} m = 7n - 1 \\ 1 - n = m \end{cases}$

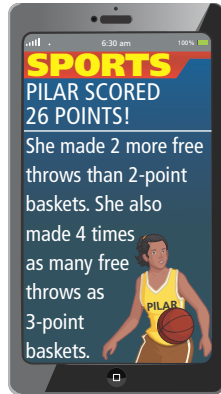
Write the system of equations described by each augmented matrix. SEE EXAMPLE 4

28. $\left[\begin{array}{cc|c} 2 & -2 & 4 \\ 1 & 2 & 11 \end{array} \right]$ 29. $\left[\begin{array}{cc|c} 0.5 & 1 & 0 \\ -1 & 4 & 2 \end{array} \right]$

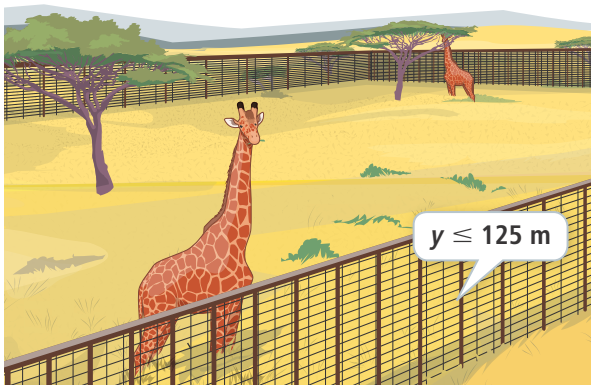
30. Charles has a collection of dimes and quarters worth \$1.25. He has 8 coins. What are a system of equations and an augmented matrix that can represent this situation? SEE EXAMPLE 5
31. A set of triangular and square tiles contains 50 pieces and 170 sides. Write a system of equations and an augmented matrix to represent this situation. SEE EXAMPLE 5

APPLY

- 32. Model With Mathematics** In basketball, a successful free throw is worth 1 point, a basket made from inside the 3-point arc is worth 2 points, and a basket made from outside the 3-point arc basket is worth 3 points. How many of each type of basket did Pilar make?



- 33. Use Structure** Raul is paid \$75 per week plus \$5 for each new gym membership he sells. He may switch to a gym that pays \$50 per week and \$7.50 for each new membership. How many memberships per week does Raul have to sell for the new gym to be a better deal for him?
- 34. Reason** Keisha is designing a rectangular giraffe enclosure with a length of at most 125 m. The animal sanctuary can afford at most 300 m of fencing, and the length of the enclosure must be at least double the width.



- Write inequalities to represent each constraint where x = width and y = length.
 - Graph and solve the linear system of inequalities.
 - What does the solution mean?
- 35. Make Sense and Persevere** Ramona needs 10 mL of a 30% saline solution. She has a 50% saline solution and a 25% saline solution. How many milliliters of each solution does she need to create the 30% solution?

ASSESSMENT PRACTICE

- 36.** One equation in a system of equations with one solution is $4x + 2y = 14$. Determine if each equation could be the second equation in the system. Select **Yes** or **No**.

- | | | |
|--------------------|---------------------------|--------------------------|
| a. $2x + y = 7$ | <input type="radio"/> Yes | <input type="radio"/> No |
| b. $3x - 6y = -12$ | <input type="radio"/> Yes | <input type="radio"/> No |
| c. $2x + 6y = 32$ | <input type="radio"/> Yes | <input type="radio"/> No |
| d. $-3x + 10y = 1$ | <input type="radio"/> Yes | <input type="radio"/> No |
| e. $2x + y = 5$ | <input type="radio"/> Yes | <input type="radio"/> No |

- 37. SAT/ACT** What value of a gives $(-1, 1)$ as the solution of the system $\begin{cases} 3x + 5y = 2 \\ ax + 8y = 14 \end{cases}$?
- Ⓐ -22 Ⓑ -6 Ⓒ 0 Ⓓ 6 Ⓔ 22

- 38. Performance Task** Students at a high school collected aluminum cans and plastic bottles. The table shows the average number of cans and bottles collected per student, by grade level, at three different football games.



	Game 1	Game 2	Game 3
Sophomores	3	4	4
Juniors	4	4	3
Seniors	5	6	7

Part A Write a system of equations that could determine the number of students who collected cans at each game.

Part B Use a matrix to determine the solution of the system of equations you found in Part A.

Part C What is the total average number of cans and bottles collected per student in each grade level?