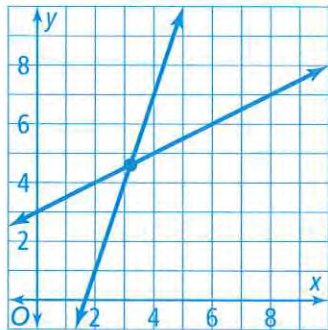


EXPLORE & REASON

The graph shows two lines that intersect at one point.



- A. What are the approximate coordinates of the point of intersection?
- B. How could you verify whether the coordinates you estimated are, in fact, the solution? Is the point the solution to the equations of both lines?
- C. **Make Sense and Persevere** Use your result to refine your approximation, and try again. Can you find the point of intersection this way? Is there a more efficient way? © MP.1

HABITS OF MIND

Communicate Precisely The graphs of two equations appear to intersect at the point (2, 3). Does that guarantee that $x = 2$ and $y = 3$ is a solution to both equations? Explain. © MP.6

EXAMPLE 1  **Try It! Solve a System of Linear Equations**

1. Solve each system of equations.

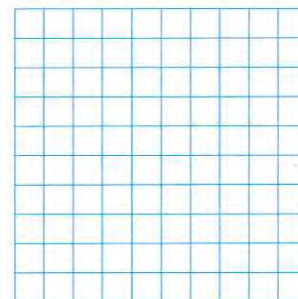
a.
$$\begin{cases} 2x + y = -1 \\ 5y - 6x = 7 \end{cases}$$

b.
$$\begin{cases} 3x + 2y = 5 \\ 6x + 4y = 3 \end{cases}$$

EXAMPLE 2  **Try It! Solve a System of Linear Inequalities**

2. Sketch the graph of the set of all points that solve this system of linear inequalities.

$$\begin{cases} 2x + y \leq 14 \\ x + 2y \leq 10 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

**HABITS OF MIND****Make Sense and Persevere** Is it possible to solve a system of linear inequalities using the same methods you used to solve a system of linear equations? © MP.1**EXAMPLE 3**  **Try It! Solve a System of Equations in Three Variables**

3. Solve the following systems of equations.

a.
$$\begin{cases} x + y + z = 3 \\ x - y + z = 1 \\ x + y - z = 2 \end{cases}$$

b.
$$\begin{cases} 2x + y - 2z = 3 \\ x - 2y + 7z = 12 \\ 3x - y + 5z = 10 \end{cases}$$

HABITS OF MIND**Generalize** What is the goal of the substitution and elimination methods? © MP.8

**EXAMPLE 4** **Try It! Write a System of Equations as a Matrix**

4. Write the matrix for the system of equations or the system of equations for the matrix.

a.
$$\begin{cases} 3x - y = 4 \\ -2x + 7y = 20 \end{cases}$$

b.
$$\left[\begin{array}{ccc|c} 0 & 2 & 3 & 4 \\ 8 & -1 & -2 & 5 \\ 2 & 0 & 1 & 9 \end{array} \right]$$

EXAMPLE 5 **Try It! Relate Systems of Equations and Matrices**

5. a. Write the system of equations described by the augmented matrix. Describe a real-world situation that could be modeled by the system.

$$\left[\begin{array}{cc|c} 1 & 1 & 10 \\ 3 & 2 & 80 \end{array} \right]$$

- b. What would the matrix $\left[\begin{array}{cc|c} 1 & 0 & 20 \\ 0 & 1 & 10 \end{array} \right]$ represent in terms of your real-world situation?

HABITS OF MIND

Communicate Precisely What characteristics must a system of equations have for it to be appropriate to rewrite it in matrix form? © MP.6



Do You UNDERSTAND?

- ESSENTIAL QUESTION** How can you find and represent solutions of systems of linear equations and inequalities?
- Error Analysis** Shandra said the solution of the system of equations $\begin{cases} 2x + y = 3 \\ -x + 4y = -6 \end{cases}$ is $(-1, 2)$. Is she correct? Explain. © MP.3
- Communicate Precisely** Why is a system of linear inequalities often solved graphically? © MP.6
- Make Sense and Persevere** How does knowing how to solve a system of two equations in two variables help you to solve a system of three equations in three variables? © MP.1
- Vocabulary** What is the difference between a coefficient matrix and an augmented matrix?

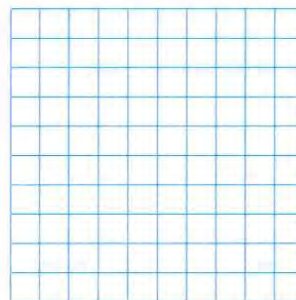
Do You KNOW HOW?

- Solve the following system of equations.

$$\begin{cases} 2x + 2y = 10 \\ x + 5y = 13 \end{cases}$$

- Graph the following system of inequalities.

$$\begin{cases} -x + 2y < 1 \\ x \geq 0 \\ y \geq 0 \end{cases}$$



- Write the system of equations represented by

the matrix $\begin{bmatrix} 1 & -2 & 2 \\ -4 & 3 & -5 \end{bmatrix}$.

- Equations with two variables that are raised only to the first power represent lines. There are three possible outcomes for the intersections of two lines. Describe the outcomes.

