Investigating Graphs of Linear Systems

GROUP ACTIVITY
Work as a class.

MATERIALS
graph paper

▶ **QUESTION** **Can two different linear equations have a solution in common?**
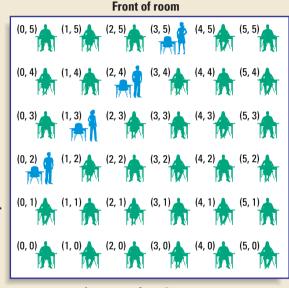
In this activity, use the following linear equations.

$$x - y = -2 \qquad \text{Equation 1}$$
$$x + y = 4 \qquad \text{Equation 2}$$

▶ **EXPLORING THE CONCEPT**

① Turn your classroom into a coordinate grid by arranging your desks into rows. Every position in your grid should be occupied.

② Choose one student's position to represent the origin. Write down the ordered pair you represent. A sample classroom grid is shown.

③ Substitute the x-value and y-value that you represent into Equation 1. If you get a true statement, stand up.

Front of room

y increases from 0

x increases from 0 ⟶

④ What do you notice about the positions of the students standing up? On graph paper, draw axes and plot a point for each student who is standing.

⑤ Have everyone sit down. Then repeat **Step 3** and **Step 4** using Equation 2.

▶ **DRAWING CONCLUSIONS**

1. Look at your graph and describe what you observe. Which student's ordered pair do you think will make both equations true? Is this the only ordered pair that is a solution of both equations? Explain.

In Exercises 2–5, use the class as a coordinate grid to find an ordered pair that is a solution of both equations.

2. $x - y = -1$
$\quad x + y = 3$

3. $x + y = 4$
$\quad -x + y = -2$

4. $-x + y = 0$
$\quad x + y = 6$

5. $x = 3$
$\quad y = 2$

6. *Writing* In this activity your class has been modeling the solutions of pairs of linear equations. What have you learned about the solutions of two linear equations whose graphs intersect at one point?