LESSON 3.2 **Investigating Algebra Activity:**
Linear Equations

For use before the lesson "Graph Linear Equations"

Materials: ruler, graph paper, pencil

QUESTION **What can you observe about the graph of the ordered pairs that are solutions to a linear equation?**

An example of a *linear equation* in x and y is $3x - 2y = 8$. A *solution* of a linear equation is an ordered pair (x, y) that makes the equation true. For example, $(4, 2)$ is a solution of the equation $3x - 2y = 8$ because $3(4) - 2(2) = 12 - 4 = 8$.

EXPLORE **Determine solutions of a linear equation**

Given that $(4, 2)$ and $(0, -4)$ are solutions of the equation $3x - 2y = 8$, determine whether each point is also a solution.
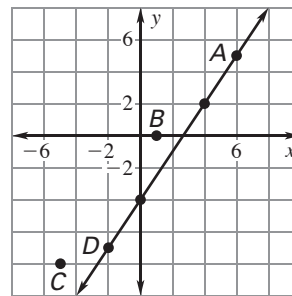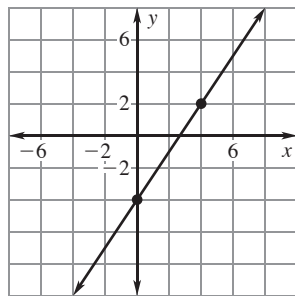
a. $A(6, 5)$ **b.** $B(1, 0)$ **c.** $C(-5, -8)$ **d.** $D(-2, -7)$

STEP 1 Plot solutions
Plot the given solution $(4, 2)$ and $(0, -4)$ on a coordinate grid. Draw a line through them. This is the graph of the linear equation $3x - 2y = 8$.

STEP 2 Plot points A, B, C, and D
Plot points A, B, C, and D on the same coordinate grid.

STEP 3 Determine solutions
Look at the graph in Step 2. The points that lie on the same line as the given solutions, points A and D, are also solutions of the equation $3x - 2y = 8$. Points B and C do not lie on the line, so they are not solutions of the equation.

DRAW CONCLUSIONS **Plot the solution points A and B and draw the line that connects them. Then plot the given points C, D, and E and use the graph to determine which points are also solutions to the equation. Verify your answers by substituting in the equation.**

1. Equation: $2x + y = 5$
Solutions: $A(2, 1)$, $B(-1, 7)$
Points: $C(5, -5)$, $D(3, -4)$, $E(0, 5)$

2. Equation: $-x + 2y = -6$
Solutions: $A(0, -3)$, $B(6, 0)$
Points: $C(2, -2)$, $D(-4, -4)$, $E(-8, -8)$