

# 8-8 Systems of Equations (Pages 412–416)

Two equations with the same two variables form a **system of equations**. A **solution** of a system is an ordered pair that is a solution of both equations.

<b>Solutions to Systems of Equations</b>	<ul style="list-style-type: none"> <li>• When the graphs of two linear equations intersect in exactly one point, the system has exactly one ordered pair as its solution.</li> <li>• When the graphs of two linear equations are parallel, the system has no solution.</li> <li>• When the graphs are the same line, the system has infinitely many solutions.</li> </ul>
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### EXAMPLE

Use a graph to solve the system of equations  $y = x + 1$  and  $y = 2x + 3$ .

The graph of  $y = x + 1$  has an  $x$ -intercept of  $-1$  and a  $y$ -intercept of  $1$ .

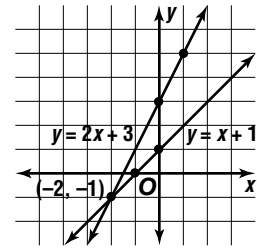
Therefore, two points on this line are  $(-1, 0)$  and  $(0, 1)$ .

The graph of  $y = 2x + 3$  has a  $y$ -intercept of  $3$ . Thus, one point on this line is  $(0, 3)$ .

Using the slope of  $2$  or  $\frac{2}{1}$ , we find another point on the line at  $(1, 5)$ .

The graphs of the lines containing each set of points intersect at  $(-2, -1)$ .

Therefore the solution to the system is  $(-2, -1)$ .



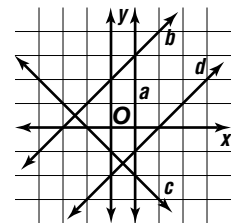
### Try These Together

- Use the graph in PRACTICE to find the solution of the system of equations represented by line  $a$  and line  $b$ .
- Use a graph to solve the system of equations  $y = -2x + 1$  and  $y = x - 2$ .

### PRACTICE

The graphs of several equations are shown to the right. State the solution of each system of equations.

- $a$  and  $c$
- $c$  and the  $y$ -axis
- $a$  and  $d$
- $b$  and  $d$
- $b$  and  $c$
- $d$  and the  $x$ -axis
- $b$  and  $c$
- $a$  and  $c$



Use a graph to solve each system of equations.

- $y = 2x - 3$   
 $y = -x$
- $y = x - 2$   
 $y = \frac{1}{2}x - 1$
- $y = -3x + 2$   
 $y = 5 - 3x$



**12. Standardized Test Practice** Which ordered pair is the solution to the system of equations  $y = -3x$  and  $y = -2x - 4$ ?

- A**  $(1, 3)$       **B**  $(2, -6)$       **C**  $(4, -12)$       **D**  $(1, -6)$

**Answers:** 1.  $(1, 3)$  2. See Answer Key. 3.  $(1, -2)$  4. no solution 5.  $(0, -1)$  6.  $(2, 0)$  7.  $(1, -1)$  8.  $(-1.5, 0.5)$  9–11. See Answer Key. 12. C