NAME _____ DATE _____ PERIOD _____

7-1 Graphing Systems of Equations

(Pages 369–374)

A set of equations with the same variables forms a **system of equations**. A solution to a system of two equations with two variables is an ordered pair of numbers that satisfies both equations. One way to solve a system of equations is to carefully graph the equations on the same coordinate plane. The coordinates of the point at which the graphs intersect is the solution to the system. If the graphs of the two equations coincide, meaning they are the same line, then there are *infinitely many* solutions to the system. A system of equations with at least one ordered pair that satisfies both equations is **consistent**. It is possible for the graphs of the two equations to be parallel. In this case, the system is inconsistent because there are *no solutions* that satisfy the two equations.

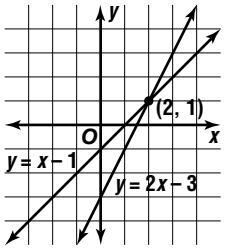
Example

Graph the system of equations to find the solution.
$y = 2x - 3$ and $y = x - 1$

The graphs appear to intersect at the point with coordinates (2, 1).
Check this estimate by replacing x with 2 and y with 1 in each equation.

Check: $y = 2x - 3$ $\qquad$ $y = x - 1$
$1 = 2(2) - 3$ $\qquad$ $1 = 2 - 1$
$1 = 1$ ✓ $\qquad$ $1 = 1$ ✓

The solution is (2, 1).



Try These Together

Graph each system of equations. Then determine whether the system has* one *solution,* no *solution, or* infinitely many *solutions. If the system has one solution, name it.

1. $y = x + 2$
$y = 2x - 1$

2. $y = x + 2$
$y = x - 1$

3. $y = 2x - 1$
$y = 3(x - 1)$

HINT: Be sure to check your solution by substituting the x- and y-values back into the two equations.

Practice

Graph each system of equations. Then determine whether the system has *one* solution, *no* solution, or *infinitely many* solutions. If the system has one solution, name it.

4. $y = 10 - x$
$y = x + 1$

5. $2x + y = -5$
$3x + 3y = 9$

6. $y = 8 - x$
$y = 4 - \frac{1}{3}x$

7. $y = -3$
$4x + y = 1$

8. **Standardized Test Practice** A canoe can be paddled 10 miles upstream, against the river current, in 5 hours. Paddling downstream the same distance takes 1 hour. Write and then graph a system of equations to solve for the speed c of the canoe in still water and the speed r of the river current. Express the solution to the system as an ordered pair (c, r).

A (3, 7) **B** (7, 3) **C** (4, 6) **D** (6, 4)

Answers: **1–7.** See Answer Key for graphs. **1.** one; (3, 5) **2.** no solution **3.** one; (2, 3) **4.** one; (4.5, 5.5) **5.** one; (−8, 11) **6.** one; (6, 2) **7.** one; (1, −3) **8.** D