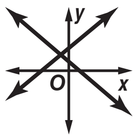
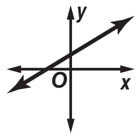
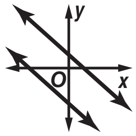
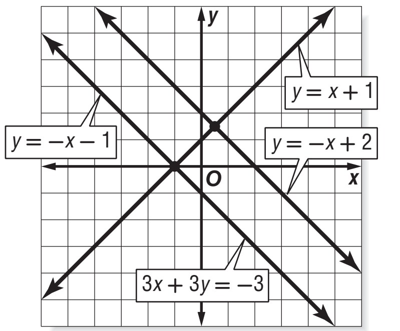
6-1 Study Guide and Intervention

Graphing Systems of Equations

Possible Number of Solutions Two or more linear equations involving the same variables form a **system of equations**. A solution of the system of equations is an ordered pair of numbers that satisfies both equations. The table below summarizes information about systems of linear equations.

Graph of a System	intersecting lines 	same line 	parallel lines 
Number of Solutions	exactly one solution	infinitely many solutions	no solution
Terminology	consistent and independent	consistent and dependent	inconsistent

Example **Use the graph at the right to determine whether each system is *consistent* or *inconsistent* and if it is *independent* or *dependent*.**



a. $\boldsymbol{y = -x + 2}$
$\boldsymbol{y = x + 1}$

Since the graphs of $y = -x + 2$ and $y = x + 1$ intersect, there is one solution. Therefore, the system is consistent and independent.

b. $\boldsymbol{y = -x + 2}$
$\boldsymbol{3x + 3y = -3}$

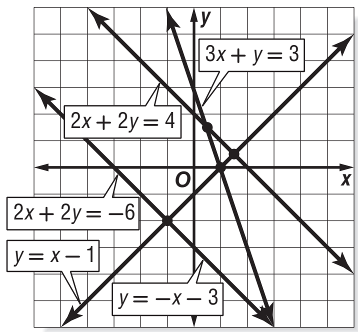
Since the graphs of $y = -x + 2$ and $3x + 3y = -3$ are parallel, there are no solutions. Therefore, the system is inconsistent.

c. $\boldsymbol{3x + 3y = -3}$
$\boldsymbol{y = -x - 1}$

Since the graphs of $3x + 3y = -3$ and $y = -x - 1$ coincide, there are infinitely many solutions. Therefore, the system is consistent and dependent.

Exercises

Use the graph at the right to determine whether each system is *consistent* or *inconsistent* and if it is *independent* or *dependent*.



1. $y = -x - 3$
$y = x - 1$

2. $2x + 2y = -6$
$y = -x - 3$

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

4. $2x + 2y = -6$
$3x + y = 3$

6-1 Study Guide and Intervention *(continued)*

Graphing Systems of Equations

Solve by Graphing One method of solving a system of equations is to graph the equations on the same coordinate plane.

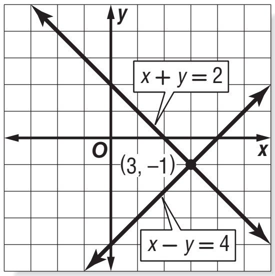
Example **Graph each system and determine the number of solutions that it has. If it has one solution, name it.**

a. $\boldsymbol{x + y = 2}$
$\boldsymbol{x - y = 4}$

The graphs intersect. Therefore, there is one solution. The point $(3, -1)$ seems to lie on both lines. Check this estimate by replacing x with 3 and y with -1 in each equation.

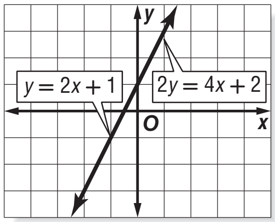
$x + y = 2$
$3 + (-1) = 2$ ✓
$x - y = 4$
$3 - (-1) = 3 + 1$ or 4 ✓

The solution is $(3, -1)$.



b. $\boldsymbol{y = 2x + 1}$
$\boldsymbol{2y = 4x + 2}$

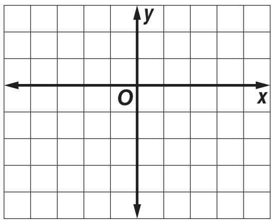
The graphs coincide. Therefore there are infinitely many solutions.



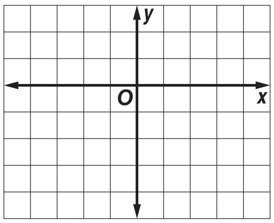
Exercises

Graph each system and determine the number of solutions it has. If it has one solution, name it.

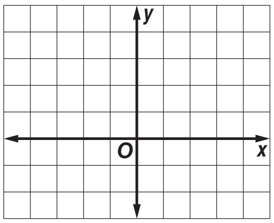
1. $y = -2$
$3x - y = -1$



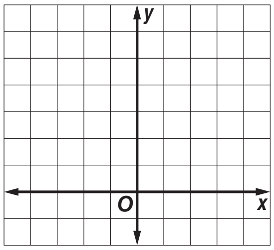
2. $x = 2$
$2x + y = 1$



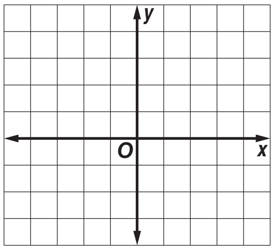
3. $y = \frac{1}{2}x$
$x + y = 3$



4. $2x + y = 6$
$2x - y = -2$



5. $3x + 2y = 6$
$3x + 2y = -4$



6. $2y = -4x + 4$
$y = -2x + 2$