

3-1 Study Guide and Intervention

Solving Systems of Equations by Graphing

Graph Systems of Equations A system of equations is a set of two or more equations containing the same variables. You can solve a system of linear equations by graphing the equations on the same coordinate plane. If the lines intersect, the solution is that intersection point.

Example

Solve the system of equations by graphing.

$$\begin{aligned} x - 2y &= 4 \\ x + y &= -2 \end{aligned}$$

Write each equation in slope-intercept form.

$$x - 2y = 4 \rightarrow y = \frac{x}{2} - 2$$

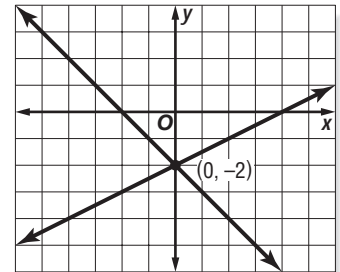
$$x + y = -2 \rightarrow y = -x - 2$$

The graphs appear to intersect at (0, -2).

CHECK Substitute the coordinates into each equation.

$$\begin{array}{rcl} x - 2y & = & 4 \\ 0 - 2(-2) & \stackrel{?}{=} & 4 \\ 4 & = & 4 \quad \checkmark \end{array} \qquad \begin{array}{rcl} x + y & = & -2 \\ 0 + (-2) & \stackrel{?}{=} & -2 \\ -2 & = & -2 \quad \checkmark \end{array}$$

The solution of the system is (0, -2).

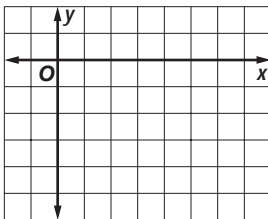


Exercises

Solve each system of equations by graphing.

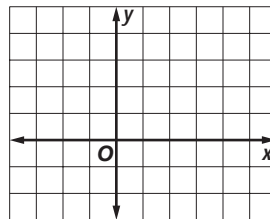
1. $y = -\frac{x}{3} + 1$

$$y = \frac{x}{2} - 4$$



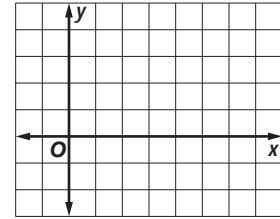
2. $y = 2x - 2$

$$y = -x + 4$$



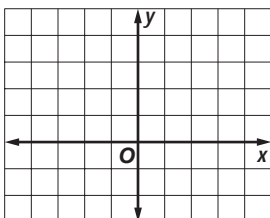
3. $y = -\frac{x}{2} + 3$

$$y = \frac{x}{4}$$



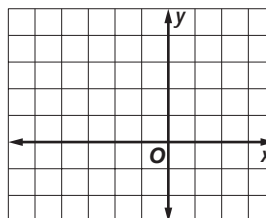
4. $3x - y = 0$

$$x - y = -2$$



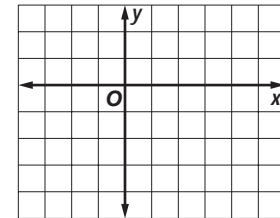
5. $2x + \frac{y}{3} = -7$

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



6. $\frac{x}{2} - y = 2$

$$2x - y = -1$$



3-1 Study Guide and Intervention *(continued)*

Solving Systems of Equations by Graphing

Classify Systems of Equations The following chart summarizes the possibilities for graphs of two linear equations in two variables.

Graphs of Equations	Slopes of Lines	Classification of System	Number of Solutions
Lines intersect	Different slopes	Consistent and independent	One
Lines coincide (same line)	Same slope, same y-intercept	Consistent and dependent	Infinitely many
Lines are parallel	Same slope, different y-intercepts	Inconsistent	None

Example

Graph the system of equations and describe it as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

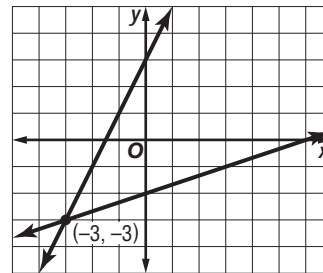
$$\begin{aligned} x - 3y &= 6 \\ 2x - y &= -3 \end{aligned}$$

Write each equation in slope-intercept form.

$$x - 3y = 6 \quad \rightarrow \quad y = \frac{1}{3}x - 2$$

$$2x - y = -3 \quad \rightarrow \quad y = 2x + 3$$

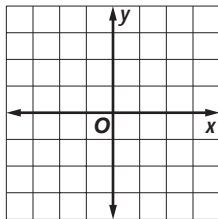
The graphs intersect at $(-3, -3)$. Since there is one solution, the system is consistent and independent.



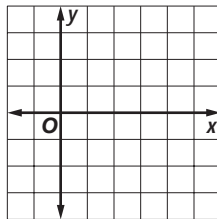
Exercises

Graph the system of equations and describe it as *consistent and independent*, *consistent and dependent*, or *inconsistent*.

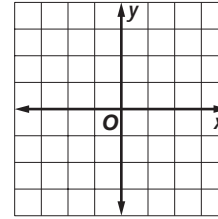
1. $3x + y = -2$
 $6x + 2y = 10$



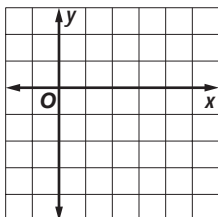
2. $x + 2y = 5$
 $3x - 15 = -6y$



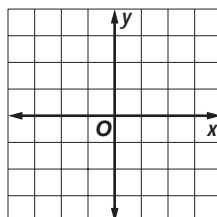
3. $2x - 3y = 0$
 $4x - 6y = 3$



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



5. $4x + y = -2$
 $2x + \frac{y}{2} = -1$



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

