Warm Up

Use substitution to determine if (1, −2) is an element of the solution set of the linear equation.

1. $y = 2x + 1$ ✗

$-2 = 2(1) + 1$

$-2 = 3$

2. $y = 3x - 5$ ✓

$-2 = 3 - 5$

$-2 = -2$

Write each equation in slope-intercept form.

3. $2y + 8x = 6$

$2y = -8x + 6$

$y = -4x + 3$

4. $4y - 3x = 8$

3-1 Using Graphs and Tables to Solve Linear Systems

Objectives

Solve systems of equations by using graphs and tables.

Classify systems of equations, and determine the number of solutions.

3-1 Using Graphs and Tables to Solve Linear Systems

Vocabulary

system of equations
linear system
consistent system
inconsistent system
independent system
dependent system

3-1 Using Graphs and Tables to Solve Linear Systems

A **system of equations** is a set of two or more equations containing two or more variables. A **linear system** is a system of equations containing only linear equations.

Recall that a line is an infinite set of points that are solutions to a linear equation. The solution of a system of equations is the set of all points that satisfy each equation.

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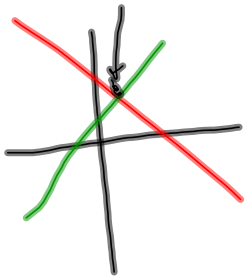
3-1 Using Graphs and Tables to Solve Linear Systems

On the graph of the system of two equations, the solution is the set of points where the lines intersect. A point is a solution to a system of equation if the x- and y-values of the point satisfy both equations.



Since a solution is just an intersection of two lines, to check to see if a point is a solution just plug it into each equation. If it is true for both that means both have that point and therefore it is an intersection.

Use substitution to determine if the given ordered pair is an element of the solution set for the system of equations.

$(1, 3)$; $\begin{cases} x - 3y = -8 \checkmark \\ 3x + 2y = 9 \checkmark \end{cases}$ Yes, soln

$1 - 3(3) = -8$
$1 - 9 = -8$
$-8 = -8$

$3(1) + 2(3) = 9$
$3 + 6 = 9$
$9 = 9$

Use substitution to determine if the given ordered pair is an element of the solution set for the system of equations.

$(-4, \frac{1}{2})$; $\begin{cases} x + 6 = 4y \checkmark \\ 2x + 8y = 1 \end{cases}$ No, not soln

$-4 + 6 = 4(\frac{1}{2})$
$2 = 2$

$2(-4) + 8(\frac{1}{2}) = 1$
$-8 + 4 = 1$
$-4 = 1$

Use substitution to determine if the given ordered pair is an element of the solution set for the system of equations.

$$(4, 3); \begin{cases} x + 2y = 10 \\ 3x - y = 9 \end{cases}$$

You can also use tables or graphs to find solutions. Remember a solution is just an intersection or a point that both lines have. So on a graph look for the intersection and a table look for a common point.

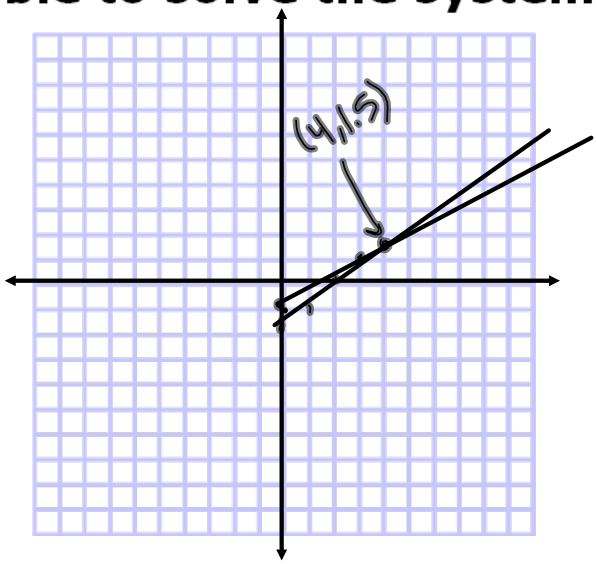
Use a graph and a table to solve the system. Check your answer.

$$\begin{cases} 2x - 3y = 3 \\ y + 2 = x \end{cases}$$

$-3y = -2x + 3$

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

$y = x - 2$

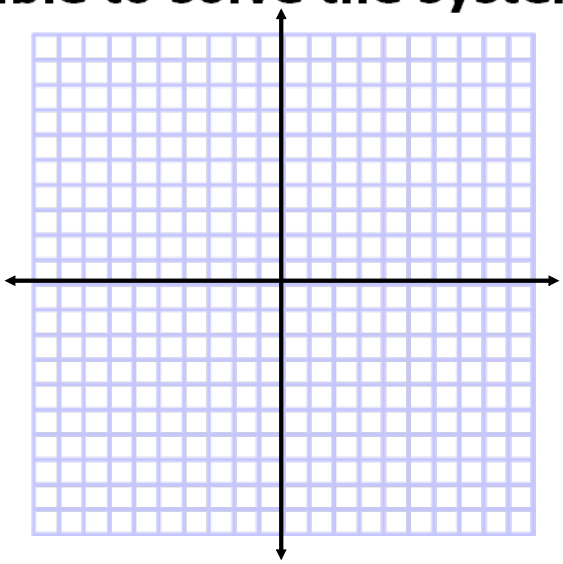


Use a graph and a table to solve the system. Check your answer.

$$\begin{cases} x - y = 2 \\ 2y - 3x = -1 \end{cases}$$

$y = x - 2$

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



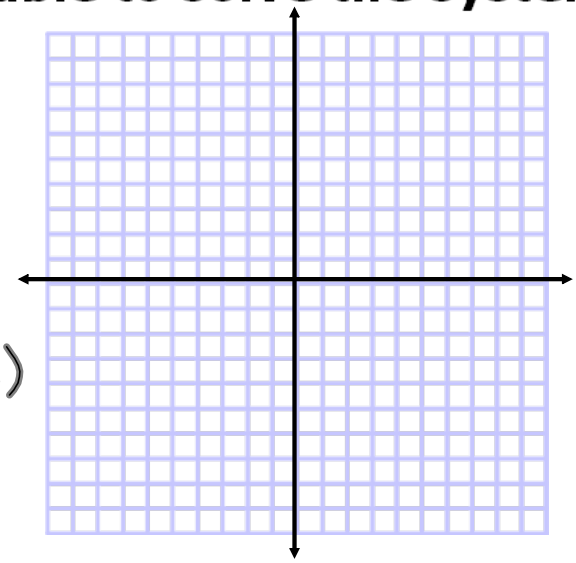
Use a graph and a table to solve the system. Check your answer.

$$\begin{cases} 2y + 6 = x \\ 4x = 3 + y \end{cases}$$

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

$y = 4x - 3$

$(0, -3)$



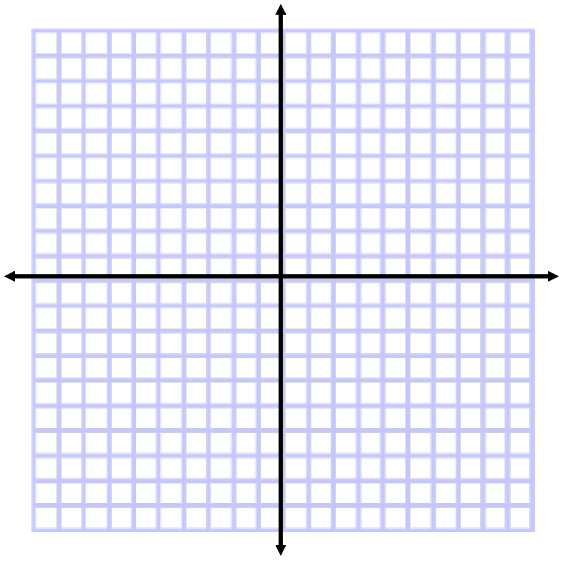
Use a graph and a table to solve the system. Check your answer.

$$\begin{cases} x + y = 8 \\ 2x - y = 4 \end{cases}$$

$y = -x + 8$

$y = 2x - 4$

$(4, 4)$



3-1 Using Graphs and Tables to Solve Linear Systems

at least 1 soln

The systems of equations in Example 2 have exactly one solution. However, linear systems may also have infinitely many or no solutions. A **consistent system** is a set of equations or inequalities that has at least one solution, and an **inconsistent system** will have no solutions.

has 0 soln

3-1 Using Graphs and Tables to Solve Linear Systems

has different slopes

You can classify linear systems by comparing the slopes and *y*-intercepts of the equations. An **independent system** has equations with different slopes. A **dependent system** has equations with equal slopes and equal *y*-intercepts.

has same slope

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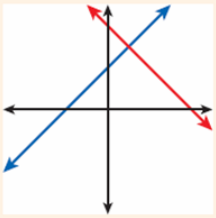
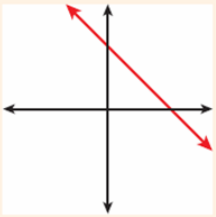
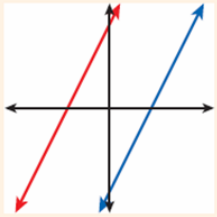
3-1 Using Graphs and Tables to Solve Linear Systems

Classifying Linear Systems

EXACTLY ONE SOLUTION	INFINITELY MANY SOLUTIONS	NO SOLUTION
		
Consistent, independent The graphs are intersecting lines with different slopes.	Consistent, dependent The graphs are coinciding lines; they have the same slope and same *y*-intercept.	Inconsistent The graphs are parallel lines; they have the same slope but different *y*-intercepts.

First look at the slopes:

If they are different then the system is consistent and independent.

If they are the same then they either have the same y-intercept and are consistent and dependent (because they are the same line), or if they have different y-intercepts then they are inconsistent.

Classify the system and determine the number of solutions.

$$\begin{cases} x = 2y + 6 \\ 3x - 6y = 18 \end{cases}$$

consistent + dependent

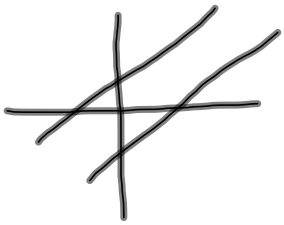
$2y = x - 6$ $\quad -6y = -3x + 18$

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

infinite sol^

Classify the system and determine the number of solutions.

$$\begin{cases} 4x + y = 1 \\ y + 1 = -4x \end{cases}$$



$y = -4x + 1$

$y = -4x - 1$

inconsistent

0 sol^

Classify the system and determine the number of solutions.

$$\begin{cases} 7x - y = -11 \\ 3y = 21x + 33 \end{cases}$$

$-y = -7x - 11$

$y = 7x + 11$

$y = 7x + 11$

$y = 7x + 11$

consistent + dependent

infinite sol^n

Classify each system and determine the number of solutions.

$$\begin{cases} x + 4 = y \\ 5y = 5x + 35 \end{cases}$$

Give an example of two equations that are consistent and independent, an example that are consistent and dependent and an example that are inconsistent.

$\begin{cases} y=3x+2 \\ y=-2+6 \end{cases}$ $\begin{cases} y=3x+1 \\ y=3x+1 \end{cases}$ $\begin{cases} y=x+1 \\ y=x+4 \end{cases}$

City Park Golf Course charges $20 to rent golf clubs plus $55 per hour for golf cart rental. Sea Vista Golf Course charges $35 to rent clubs plus $45 per hour to rent a cart. For what number of hours is the cost of renting clubs and a cart the same for each course?

$y=55x+20$

$y=45x+35$

$(1.5, 100)$

Ravi is comparing the costs of long distance calling cards. To use card A, it costs $0.50 to connect and then $0.05 per minute. To use card B, it costs $0.20 to connect and then $0.08 per minute. For what number of minutes does it cost the same amount to use each card for a single call?

$y = .05x + .50$

$y = .08x + .20$

$(10, 1)$

Homework:

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