Name pg 479 Class 6 Date

11.1 Solving Linear Systems by Graphing

Essential Question: How can you find the solution of a system of linear equations by graphing?

Resource Locker

Explore Types of Systems of Linear Equations

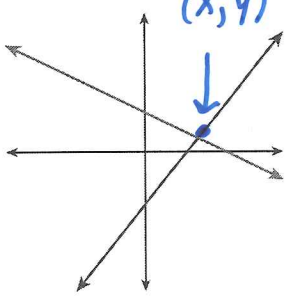
A **system of linear equations**, also called a *linear system*, consists of two or more linear equations that have the same variables. A **solution of a system of linear equations** with two variables is any ordered pair that satisfies all of the equations in the system.

Solution

(A) Describe the relationship between the two lines in Graph A.

They intersect @ 1 place.

Graph A



(B) What do you know about every point on the graph on a linear equation?

Every point (ordered pair) is a solution to a linear equ.

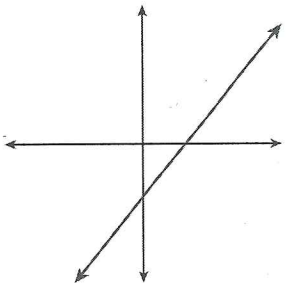
(C) How many solutions does a system of two equations have if the graphs of the two equations intersect at exactly one point?

1

(D) Describe the relationship between the two lines that coincide in Graph B.

one lin. equ. on top of the other

Graph B



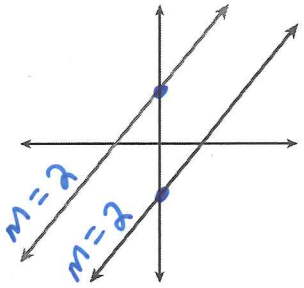
(E) How many solutions does a system of two equations have if the graphs of the two equations intersect at infinitely many points?

∞ many solutions.

(F) Describe the relationship between the two lines in Graph C.

Parallel lines

Graph C



(G) How many solutions does a system of two equations have if the graphs of the two equations do not intersect?

None

Reflect

1. Discussion Explain why the solution of a system of two equations is represented by any point where the two graphs intersect.

Explain 1 Solving Consistent, Independent Linear Systems by Graphing

A **consistent system** is a system with at least one solution. Consistent systems can be either independent or dependent.

An **independent system** has exactly one solution. The graph of an independent system consists of two lines that intersect at exactly one point. A **dependent system** has infinitely many solutions. The graph of a dependent system consists of two coincident lines, or the same line.

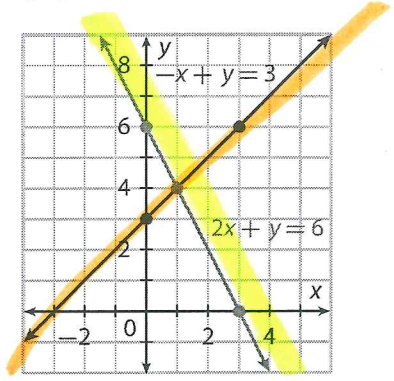
A system that has no solution is an **inconsistent system**.

Example 1 **Solve the system of linear equations by graphing. Check your answer.**

(A) $\begin{cases} 2x + y = 6 \\ -x + y = 3 \end{cases}$

Find the intercepts for each equation, plus a third point for a check. Then graph.

$2x + y = 6$	$-x + y = 3$
x-intercept: 3	x-intercept: -3
y-intercept: 6	y-intercept: 3
third point: $(-1, 8)$	third point: $(3, 6)$



The two lines appear to intersect at $(1, 4)$. Check.

$2x + y = 6$	$-x + y = 3$
$2(1) + 4 \stackrel{?}{=} 6$	$-(1) + 4 \stackrel{?}{=} 3$
$6 = 6$	$3 = 3$

Solution ←

The point satisfies both equations, so the solution is $(1, 4)$.

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

Find the intercepts for each equation, plus a third point for a check. Then graph.

$y = 2x - 2$

x-intercept: ☐

y-intercept: ☐

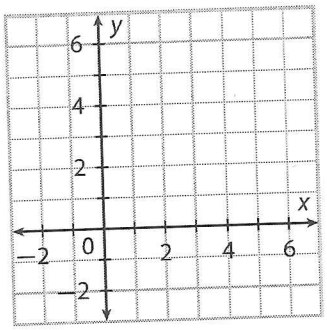
third point: $(3, \square)$

$3y + 6x = 18$

x-intercept: ☐

y-intercept: ☐

third point: $(1, \square)$



The two lines appear to intersect at ☐. Check.

$y = 2x - 2$

$\square \stackrel{?}{=} 2(\square) - 2$

$\square = \square$

$y + 2x = 6$

$\square + 2(\square) \stackrel{?}{=} 6$

$\square = 6$

The point satisfies both equations, so the solution is ☐.

Reflect

2. How do you know that the systems of equations are consistent? How do you know that they are independent?

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_____

Your Turn

Solve the system of linear equations by graphing. Check your answer.

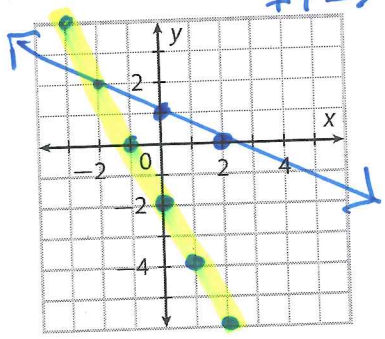
3. $\begin{cases} y = -2x - 2 \\ x + 2y = 2 \end{cases}$

$b = -2$

$m = \frac{-2}{+1}$

x-int 2

y-int 1



Solution to the system (-2, 2)

4. $\begin{cases} y = 2x + 8 \\ -x + y = 6 \end{cases}$

$m = \frac{+2}{+1}$ $b = 8$ . . (start)

$-1x + y = 6$

y-int 6

x-int -6

solution (-2, 4)