Section 4.1: SOLVING SYSTEMS OF LINEAR EQUATIONS BY GRAPHING

When you are done with your homework you should be able to…

- π Decide whether an ordered pair is a solution of a linear system
- π Solve systems of linear equations by graphing
- π Use graphing to identify systems with no solution or infinitely many solutions
- π Use graphs of linear systems to solve problems

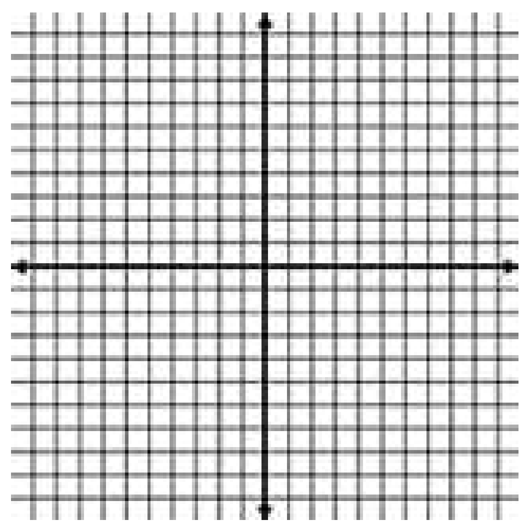
WARM-UP:

1. Determine if the given number or ordered pair is a solution to the given equation.

a. $5x+3=21;\ \frac{18}{5}$

b. $-x+2y=0;\ (4,1)$

2. Graph the line which passes through the points (0,1) and (-5,3).



SYSTEMS OF LINEAR EQUATIONS AND THEIR SOLUTIONS

We have seen that all _________________ in the form _________________ are straight _____________ when graphed. ___________ such equations are called a _________________ of ________________ __________________ or a _________________ __________________. A _________________ to a system of two ________________ equations in two _______________ is an _________________ _____________ that _______________ _______________ equations in the ________________.

Example 1: Determine whether the given ordered pair is a solution of the system.

a.

$$(-2,-5)$$
$$6x-2y=-2$$
$$3x+\ \ y=-11$$

b.

$$(10,7)$$
$$6x-\ \ 5y=25$$
$$4x+15\,y=13$$

SOLVING LINEAR SYSTEMS BY GRAPHING

The ______________ of a _________________ of two linear equations in ________ variables can be found by ________________ ______________ of the _________________ in the _______________ rectangular _________________ system. For a system with ____________ solution, the __________________ of the point of ____________________ give the ____________________ solution.

STEPS FOR SOLVING SYSTEMS OF TWO LINEAR EQUATIONS IN TWO VARIABLES, *x* AND *y*, BY GRAPHING

1. Graph the first ______________________.

2. ________________ the second equation on the _______________ set of

   _____________.

3. If the _______________ representing the __________ graphs ______________

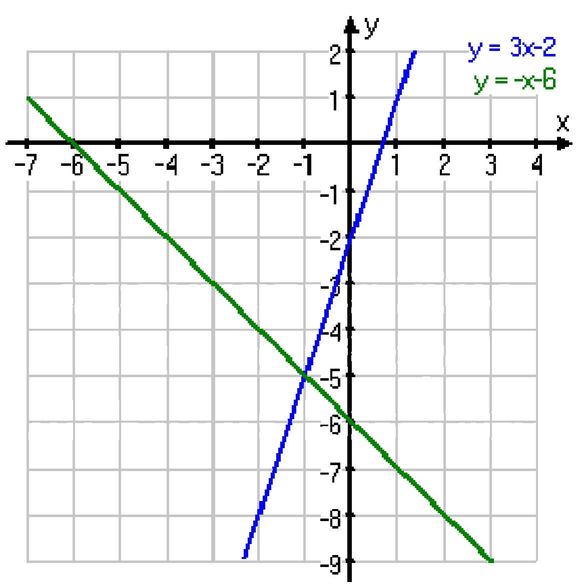
   at a _______________, determine the __________________ of this point of

   intersection. The ______________ ____________ is the __________________

   of the ________________.

4. __________________ the __________________ in ______________ equations.

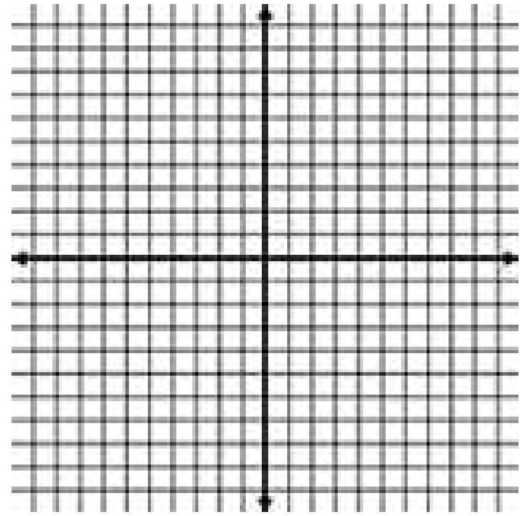
Example 2: Use the graph below to find the solution of the system of linear equations.



Example 3: Solve each system by graphing. Use set notation to express solution sets.

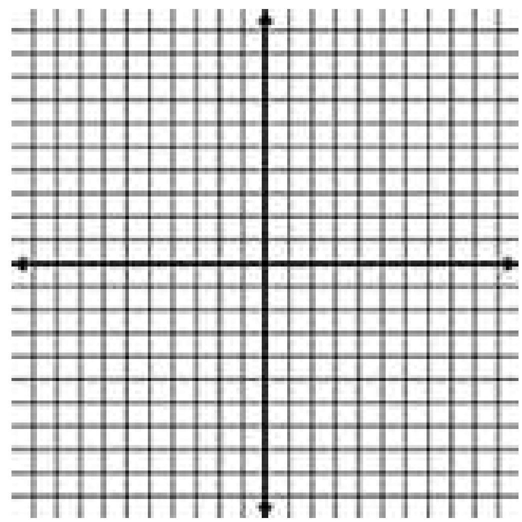
a.

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



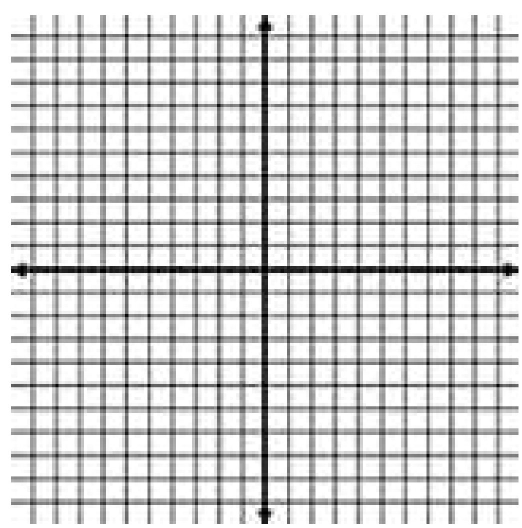
b.

$$y = 3x - 4$$
$$y = -2x + 1$$



c.

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



LINEAR SYSTEMS HAVING NO SOLUTION OR INFINITELY MANY SOLUTIONS

We have seen that a ____________________ of linear equations in __________ variables represents a ______________ of ______________. The lines either _________________ at ___________ point, are ______________, or are ______________________. Thus, there are _______________ possibilities for the ______________ of solutions to a system of two linear equations.

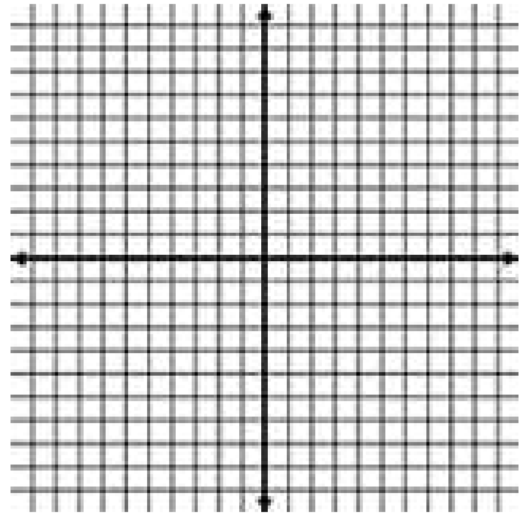
THE NUMBER OF SOLUTIONS TO A SYSTEM OF TWO LINEAR EQUATIONS

NUMBER OF SOLUTIONS	WHAT THIS MEANS GRAPHICALLY
Exactly _____________ ordered pair solution.	The two lines _________________ at _________ point. This is a _________________ system.
________ Solution	The two lines are __________________. This is an __________________ system.
__________________ many solutions	The two lines are __________________. This is a system with _______________ equations.

Example 4: Solve each system by graphing. If there is no solution or infinitely many solutions, so state. Use set notation to express solution sets.

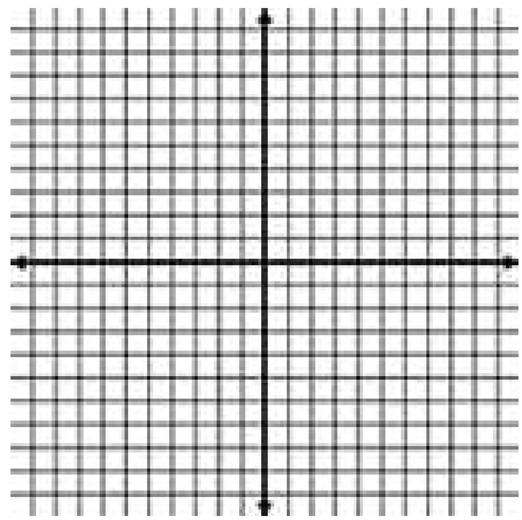
a.

$$\begin{aligned} x + y &= 4 \\ 2x + 2y &= 8 \end{aligned}$$



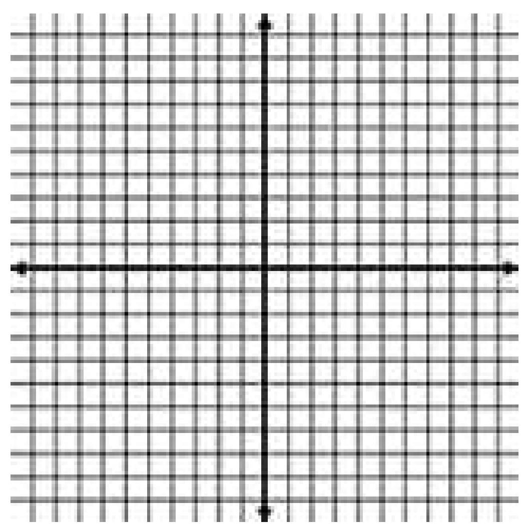
b.

$$\begin{aligned} y &= 3x - 1 \\ y &= 3x + 2 \end{aligned}$$



c.

$$\begin{aligned} 2x - y &= 0 \\ y &= 2x \end{aligned}$$

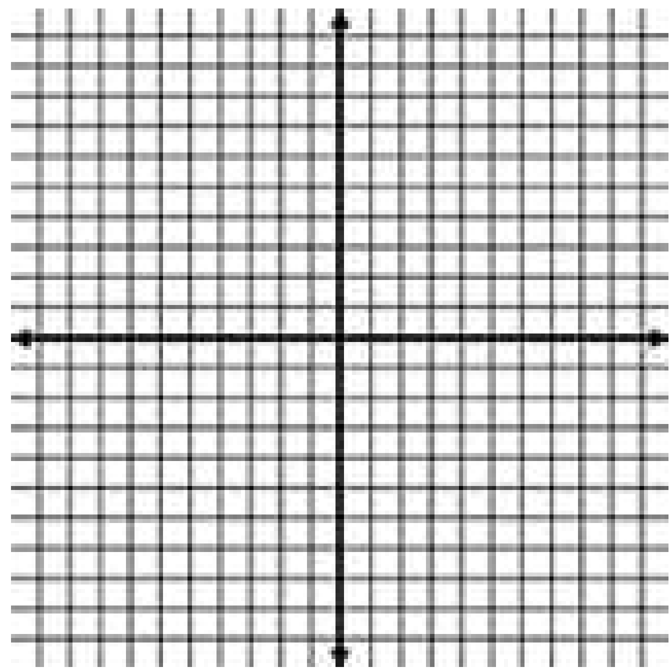


APPLICATION

A band plans to record a demo. Studio A rents for \$100 plus \$50 per hour. Studio B rents for \$50 plus \$75 per hour. The total cost, y, in dollars, of renting the studios for x hours can be modeled by the linear system

$$y = 50x + 100$$
$$y = 75x + 50$$

a. Use graphing to solve the system. Extend the x-axis from 0 to 4 and let each tick mark represent 1 unit (one hour in a recording studio). Extend the y-axis from 0 to 400 and let each tick mark represent 100 units (a rental cost of \$100).



b. Interpret the coordinates of the solution in practical terms.