

5.1 Explain – Solving Systems of Linear Equations by Graphing - Notes

Main Ideas/ Questions	Notes/Examples
What You Will Learn	<ul style="list-style-type: none"> <li>Solve systems of linear equations by graphing.</li> <li>Use systems of linear equations to solve real-life problems.</li> </ul>

What is a system of linear equations?	<b>Definition:</b> a set of two or more linear equations. Ex: $\begin{cases} 2x + 3y = 12 \\ y = 2x - 1 \end{cases}$
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What is a solution of a linear system?	<b>Definition:</b> A <b>solution</b> of a system of linear equations is... an ordered pair that makes <b>All</b> equations true. 1. Prove $(2, 5)$ is a solution for the following system: $x + y = 7$ $2 + 5 = 7$ $7 = 7$ ✓ $2x - 3y = -11$ $2(2) - 3(5) = -11$ $4 - 15 = -11$ $-11 = -11$ ✓ 2. Is $(-2, 0)$ a solution for the following system? $y = -2x - 4$ $0 = -2(-2) - 4$ $0 = 4 - 4$ $0 = 0$ ✓ $y = x + 4$ $0 = -2 + 4$ $0 \neq 2$ NOT TRUE <b><math>(-2, 0)</math> IS NOT A SOLUTION</b>
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**A system of linear equations can have....**

<p><b>One Solution</b></p> <p>The lines intersect.</p> <p>The solution is <math>(-1, 3)</math></p>	<p><b>No Solution</b></p> <p>The lines are parallel.</p> <p>Also called an <u>inconsistent system</u></p>	<p><b>Infinitely many Solutions</b></p> <p>The lines are the same line.</p> <p>Also called a <u>consistent dependent system</u></p>
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3. Use the graph to solve the system of linear equations.

$x - 2y = 5$   
 $2x + y = -5$

Solution:  $(-1, 3)$

Check your solution:

$-1 - 2(-3) = 5$	$2(-1) + 3 = -5$
$-1 + 6 = 5$	$-2 + -3 = -5$
$5 = 5$ ✓	$-5 = -5$ ✓

5.1 Explain – Solving Systems of Linear Equations by Graphing - Notes

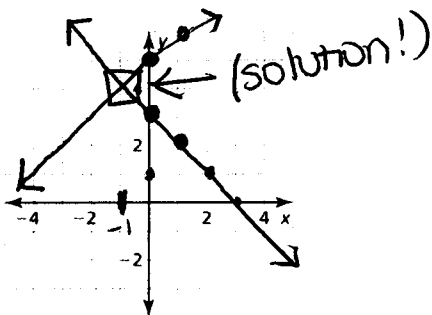
Solving Systems of Linear Equations by Graphing

**To Solve by Graphing:**

- Graph each equation in the same coordinate plane.
- 1<sup>st</sup>: Equations must be in slope-intercept form.
- 2<sup>nd</sup>: Graph each line – Begin with the “b”, move with the “m”.

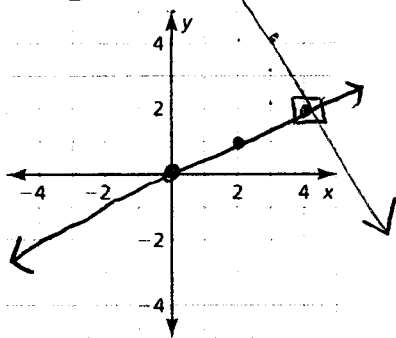
**Practice:** Solve the system of linear equations by graphing.

4.  $y = -x + 3$   $m = -1, b = 3$   
 $y = x + 5$   $m = 1, b = 5$



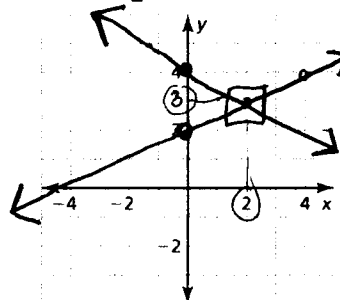
Solution:  $(-1, 4)$

6.  $2x + y = 10$   $m = -2, b = 10$   
 $-2x$   $-2x$   $\rightarrow y = -2x + 10$   
 $y = \frac{1}{2}x$   $m = \frac{1}{2}, b = 0$



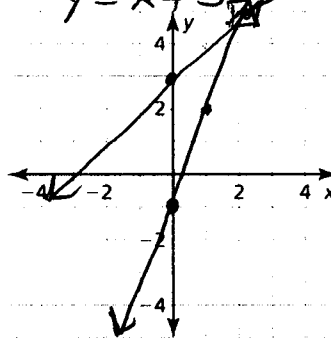
Solution:  $(4, 2)$

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



Solution:  $(2, 3)$

7.  $y = 3x - 1$   $m = 3, b = -1$   
 $2y = 2x + 6$   
 $y = x + 3$   $m = 1, b = 3$



Solution:  $(2, 5)$

Graphing Using The Calculator

**Steps to Solve Systems Using the Calculator:**

- Write both equations in slope-intercept form.
- Use “Y<sub>1</sub>” and “Y<sub>2</sub>” to enter the equations into.
- Press 2<sup>nd</sup>, Calc, 5, Enter 3 times.

\*\*\*Error: No Sign Change → are the lines are parallel? If not, change window

10.  $y = -0.5x - 2$   
 $y = -1.5x + 2$

Solution:  $(4, -4)$

11.  $-y = -4.2x + 3$   
 $y - 2x \neq 0.3$   
 $\rightarrow y = -4.2x + 3$   
 $y = 4.2x - 3$   
 $y - 2x \neq 0.3$   
 $+2x \quad +2x$   
 $y = 2x + 0.3$   
 Solution:  $(1.5, 3.3)$

# 5.1

## Solving Systems by Graphing

In Exercises 1 and 2, tell whether the ordered pair is a solution of the system of linear equations.

1.  $(3, 4)$ ;  $x + y = 7$   
 $x - 2y = -5$

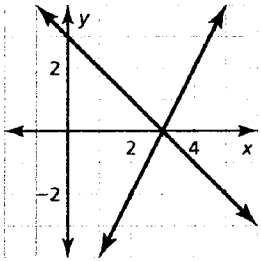
2.  $(-5, 2)$ ;  $y = -x - 3$   
 $y = 3x + 10$

In Exercises 3, use the graph to solve the system of linear equations. Check your solution.

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

Solution:

Check:



In Exercises 4 – 8, solve the system of linear equations by graphing.

4.  $y = x + 4$   
 $y = -x + 8$

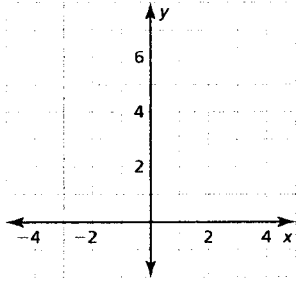
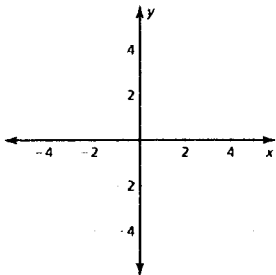
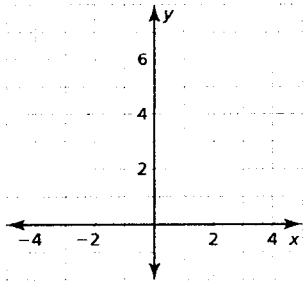
5.  $-2x + 2y = -8$   
 $x - y = 4$

6.  $y = \frac{1}{3}x + 6$   
 $y = -\frac{2}{3}x + 3$

Solution:

Solution:

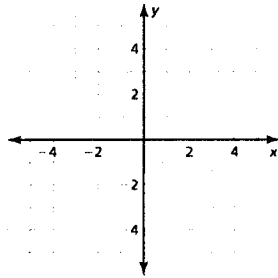
Solution:



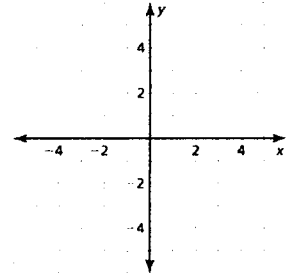
7.  $y = -5x + 3$   
 $15x + 3y = -3$

8.  $x + 2y = 8$   
 $3x - 2y = 8$

Solution:



Solution:



In Exercises 9 and 10, use a graphing calculator to solve the system of linear equations.

9.  $0.2x - 0.2y = 2$   
 $0.9x + 0.6y = 6$

10.  $-1.5x + y = 2.5$   
 $15x - 1.5y = 4.8$

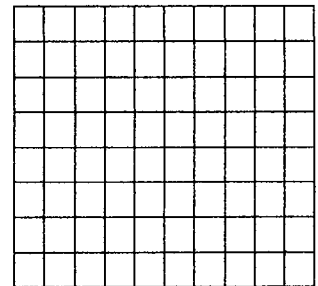
Solution:

Solution:

11. You sell bracelets,  $x$ , for \$2 each and necklaces,  $y$ , for \$3 each at a local flea market. You collect \$95, selling a total of 37 jewelry items. The situation can be represented by the following system.

$2x + 3y = 95$   
 $x + y = 37$

- a. Graph the system.  
 b. How many of each type of jewelry did you sell?



12. You begin with \$90 in your savings account and your friend begins with \$35 in her savings account. You deposit \$10 in savings each week, and your friend deposits \$15 in savings each week. The situation can be represented by the following system when  $x$  represents the number of weeks and  $y$  represents the total amount in the account.

$y = 10x + 90$        $y = 15x + 35$

- a. Graph the system.  
 b. Your friend says that in 10 weeks you will both have the same amount of money in your savings accounts. Is your friend correct? Use the graph from part (a) to explain your answer.

