

**Warm Up**

What are the slope and y-intercepts?

$$1) \quad 3x - 5 + 8 = 2x - y$$

$$\begin{array}{r} 3x + 3 = 2x - y \\ \cdot -2x \quad \cdot -2x \\ \hline x + 3 = -y \\ \cdot -1 \quad \cdot -1 \\ \hline x + 3 = -y \end{array}$$

$$y = -x - 3$$

$$m = -1 \\ b = -3$$

$$2) \quad 7x - 3y = 9$$

$$\begin{array}{r} +3y \quad +3y \\ 7x - 3y = 9 \\ \cdot -9 \quad \cdot -9 \\ \hline 7x - 9 = 3y \\ \cdot \frac{1}{3} \quad \cdot \frac{1}{3} \quad \cdot \frac{1}{3} \\ \hline \frac{7x - 9}{3} = \frac{3y}{3} \end{array}$$

$$y = \frac{7}{3}x - 3$$

$$m = \frac{7}{3} \quad b = -3$$

**Homework Questions?**

27)

$$2 \quad \begin{array}{l} 3x + 6y = 8 \\ -4x + 3y = 2 \end{array}$$

$$\begin{array}{r} -4x + 3y = 2 \\ + 6x + 12y = 16 \\ \hline \end{array}$$

$$\frac{15y}{15} = \frac{18}{15}$$

$$y = \frac{6}{5}$$

$$3x + 6\left(\frac{6}{5}\right) = 8$$

$$\begin{array}{r} 30) \\ \hline .3(0.2x - 0.5y = -3.8) \\ - .2(0.3x + 0.4y = 10.4) \end{array}$$

$$.06x - .15y = 1.14$$

$$\begin{array}{l} 26) \\ 8x + y = 15 \\ 9 = 2y + 2x \end{array}$$

$$\begin{array}{r} -2(8x + y = 15) \\ 2x + 2y = 9 \end{array} \rightarrow \begin{array}{r} -16x - 2y = -30 \\ + 2x + 2y = 9 \\ \hline -14x = -21 \end{array}$$

$$x = \frac{3}{7}$$

## Self Scoring Scale

4- I can *summarize* the concepts and explain it to others.

3- I can *apply* the concepts to answer questions correctly.

2- I can *apply* the concepts but with some *mistakes*.

1- I *need help* to know how to apply the concepts.

0- I *can't* apply the concepts even with help.

## 7.5 Special Types of Linear Systems

### Goals:

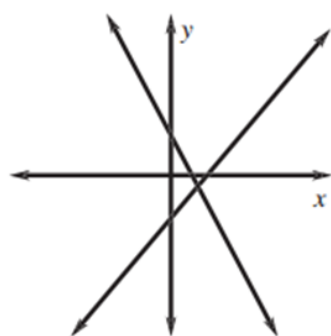
- Identify linear systems as having one solution, no solution, or infinitely many solutions.

**EQ:** What are the three special types of a linear system?

| ← Algebra 1.5 →                        |            | ① CURRENT UNIT   |  | ③ NEXT UNIT/Experience |  |                                      |  |
|--|------------|--|--|------------------------|--|--------------------------------------|--|
| ② LAST UNIT/Experience                 |            | <b>Systems</b>   |  |                        |  | Exponents                            |  |
| ⑧ Student Activities or Assignments    | ⑥ UNIT MAP |  |  |                        |  | ③                                    |  |
| 7.1<br>7.2<br>7.3<br>7.4<br>7.5<br>7.6 |            | ⑦ UNIT SELF-TEST QUESTIONS   |  | ⑥ UNIT RELATIONSHIPS   |  |                                      |  |
|  |            | <ol style="list-style-type: none"> <li>1. How do you solve a system by graphing?</li> <li>2. How is the substitution method used to solve a system?</li> <li>3. How do you use linear combinations to solve a system?</li> <li>4. How can you represent and solve a real world situation with a system of equations?</li> <li>5. How do you determine the number of solutions a system has?</li> <li>6. How do you graph a system of linear inequalities and determine the solution area?</li> </ol> |  |                        |  | Solve<br>Graph<br>Represent<br>Apply |  |

## NUMBER OF SOLUTIONS OF A LINEAR SYSTEM

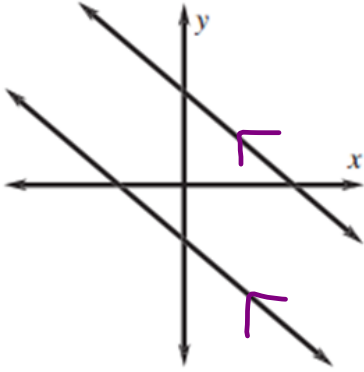
If the two solutions have Different slopes, then the system has one solution.



Lines intersect: (cross each other)  
one solution.

ex:  $x = 3$        $(3, 22)$   
 $y = 22$       ↑  
   one soln

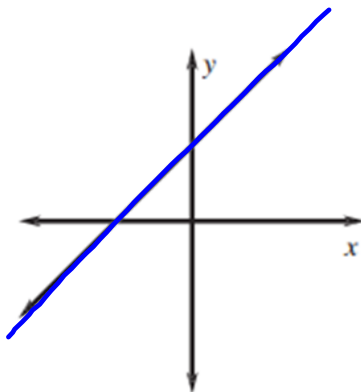
If the two solutions have the Same slope but different y-intercepts, then the system has no solution.



Lines are parallel: (Never Intersect)  
NO solution.

If Letters Cancel  
 + get False Statement  
 ex:  $5 \neq 2$  No Soln

If the two equations have the Same slope and the same y-intercepts, then the system has infinitely many solutions.



Lines coincide: (same line)  
IMS solutions.

Letters Cancel  
 + True Statement

ex:  $7 = 7 \checkmark$   
IMS

**Example 1: A Linear System with No Solution**

Show that the linear system has no solution.

$$-x + y = -3$$

$$-x + y = 2$$

Method 1: Graphing

$$-x + y = -3$$

 $+x$ 

$$y = x - 3$$

$$m=1 \quad b=-3$$

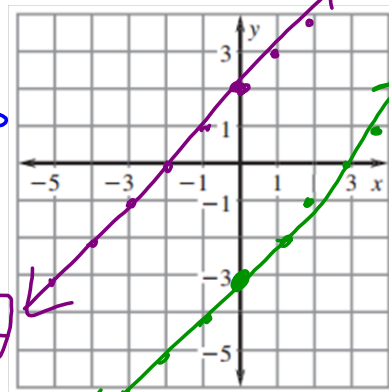
NO SOLN

$$-x + y = 2$$

 $+x$ 

$$y = x + 2$$

$$m=1 \quad b=2$$



Method 2: Substitution

$$-x + y = -3 \rightarrow -x + 1(x + 2) = -3$$

$$-x + y = 2$$

 $+x$ 

$$y = x + 2$$

$$-x + x + 2 = -3$$

$$2 = -3 \text{ False}$$

No Soln

**Example 2: A Linear System with Many Solutions**

Show that the linear system has infinitely many solutions.

$$3x + y = -1 \rightarrow y = -3x - 1$$

$$-6x - 2y = 2$$

$$+6x \quad +6x$$

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

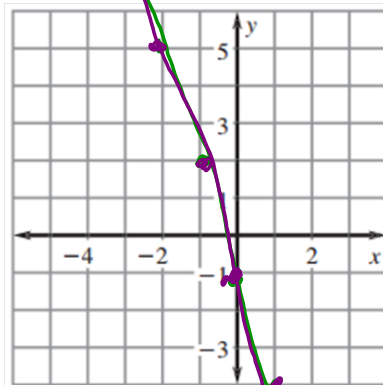
$$\frac{-2y}{-2} = \frac{6x + 2}{-2}$$

$$y = -3x - 1$$

$$m = -3$$

$$b = -1$$

IMS



$$3x + y = -1 \rightarrow y = (-3x - 1)$$

$$-6x - 2y = 2$$

$$-6x - 2(-3x - 1) = 2$$

$$-6x + 6x + 2 = 2$$

$$2 = 2 \checkmark$$

IMS

**Try It**

Use the substitution method or linear combinations to solve the linear system and tell how many solutions the system has.

$$\begin{array}{l}
 1) \quad 5(x - 2y = 3) \\
 \quad -5x + 10y = -15
 \end{array}
 \rightarrow
 \begin{array}{l}
 \cancel{5x} - \cancel{10y} = \cancel{15} \\
 \cancel{-5x} + \cancel{10y} = \cancel{-15} \\
 \hline
 0 = 0 \quad \checkmark
 \end{array}$$

IMS

$$\begin{array}{l}
 2) \quad -2(-2x + 3y = 4) \\
 \quad -4x + 6y = 10
 \end{array}
 \rightarrow
 \begin{array}{l}
 \cancel{4x} - \cancel{6y} = -8 \\
 \cancel{-4x} + \cancel{6y} = 10 \\
 \hline
 0 \neq 2
 \end{array}$$

No Soln

3)  $-25x + 15y = 2$

$5(5x - 3y = 7) \rightarrow$

$$\begin{array}{r}
 -25x + 15y = 2 \\
 + \quad 25x - 15y = 35 \\
 \hline
 0 \neq 37
 \end{array}$$

$0 \neq 37$

No Soln

4)  $x + y = -6$

$+ 11x - y = 42$

$$\begin{array}{r}
 x + y = -6 \\
 + 11x - y = 42 \\
 \hline
 12x = 36 \\
 \frac{12x}{12} = \frac{36}{12}
 \end{array}$$

$x = 3$

$3 + y = -6$

$-3 \quad -3$

$y = -9$

$11(3) - (-9) = 42 \checkmark$

one Soln

$\therefore$  yes,  $(3, -9)$  is soln



# Summary

**EQ:** What are the three special types of a linear system?

one soln  $\rightarrow (3, -2)$

NO soln  $\rightarrow 0 = -2$

IMS  $\rightarrow 3 = 3$

## 7.5 Homework

P. 429 #6-17

(6-8 pick one to use substitution)