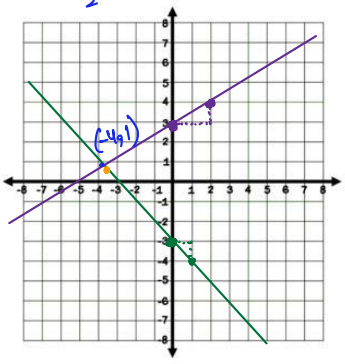
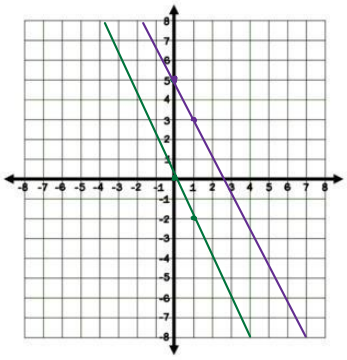
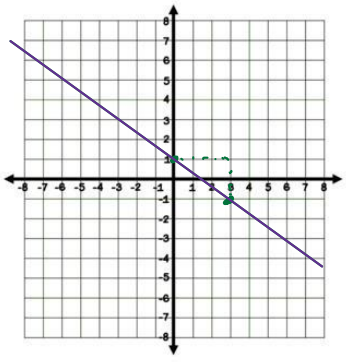
Math -I 110 3.1 Notes

Objective 1: Determine whether an ordered pair is a solution of the system of equations.
Example: Given the following systems are the ordered pairs a solution to the system

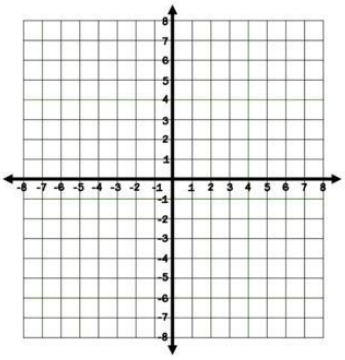
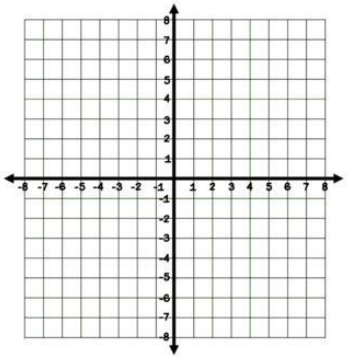
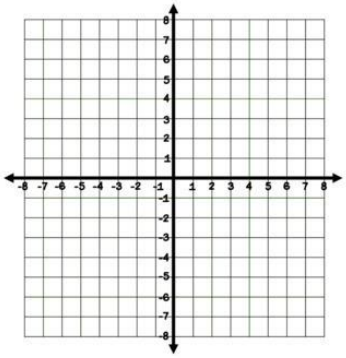
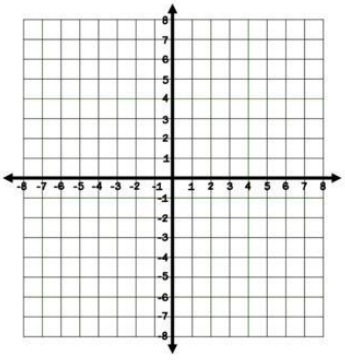
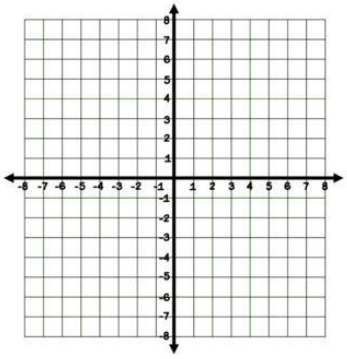
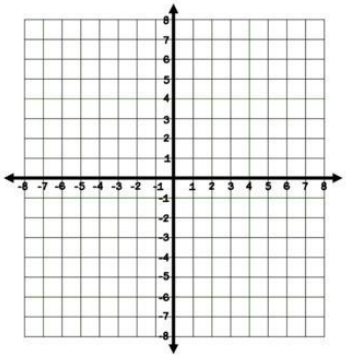
$\begin{cases} 2y = 3x - 1 \\ x + y = 7 \end{cases}$	a) (5,7) $x=5$, $y=7$ $2(7) = 3(5) - 1 \Rightarrow 14 = 14$ ✓ $5 + 7 = 7 \Rightarrow 12 = 7$ Contradiction $\Rightarrow$ Not a solution	b) (3,4) $x=3$, $y=4$ $2(4) = 3(3) - 1$ $8 = 8$ ✓ (Identity) $3 + 4 = 7 \Rightarrow 7 = 7$ (Identity) $\Rightarrow$ (3,4) is a solution.

Objective 2: Solving systems by graphing

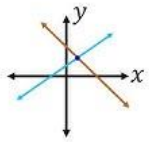
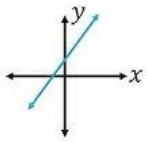
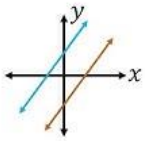
$\begin{cases} y = -x - 3 \\ y = \frac{1}{2}x + 3 \end{cases}$	$\begin{cases} y = -2x \\ y = -2x + 5 \end{cases}$	$\begin{cases} y = -\frac{2}{3}x + 1 \\ 3y = -2x + 3 \end{cases}$
$1 = -(-4) - 3 = 1$ $1 = \frac{1}{2}(-4) + 3 = 1$  		$y = -\frac{2}{3} + 1$ 
Solution: (-4, 1)	Solution: No Solution	Solution: Infinite solutions.

The solution to the system is where the graphs **cross** because that is the ordered pairs that satisfies both equations.

Let's practice solving systems of equations by graphing

$\begin{cases} y = \frac{1}{4}x - 3 \\ y = -x + 2 \end{cases}$  Solution: $(4, -2)$	$\begin{cases} y = 3x + 3 \\ y = \frac{1}{2}x - 2 \end{cases}$  Solution: $(-2, -3)$	$\begin{cases} y = \frac{1}{3}x + 4 \\ y = \frac{1}{3}x + 1 \end{cases}$  Solution: No solution
$\begin{cases} x - y = 1 \\ x = 3 \end{cases}$  Solution: $(3, 2)$	$\begin{cases} y = -3 \\ 7x - 2y = -8 \end{cases}$  Solution: $(-2, -3)$	$\begin{cases} 2x + 3y = -12 \\ 2x + 3y = 3 \end{cases}$  Solution: No solution

Understanding types of solutions

One solution	Infinitely many solutions	No solution
$\begin{cases} 5x + 2y = 10 \\ 3x - 2y = 6 \end{cases}$	$\begin{cases} y = -\frac{5}{4}x - 5 \\ 5x + 4y = -20 \end{cases}$	$\begin{cases} -2x - y = 6 \\ y = -2x - 4 \end{cases}$
• $x = 2, y = 5$	• $3 = 3$ **True**	• $0 = 9$ **False**
		
• **Consistent** • **Independent**	• **Consistent** • **Dependent**	• **Inconsistent** • **Independent**

Objective 3: Translate problems with two unknowns using a system of equations

1. Anna purchased 31 strings for her autoharp. Wrapped strings cost $4.49 each and unwrapped strings cost $2.99 each. If she paid a total of $ 115.19 for the strings, how many of each type did she buy?

Define Variables: Let x be # wrapped strings bought.
Let y be # unwrapped strings bought

Write Equations:

$$x + y = 31$$

Do not solve.

$$4.49x + 2.99y = 115.19$$

2. There is an online group that knits items for nursing homes and shelters. For a recent campaign, they spent a total of 1112 hr. knitting hats and scarves. Each hat takes 8 hr. to knit and each scarf takes 12 hr. to knit. If they donated 110 items, how many of each did they knit?

Define Variables: Let x be # hats, y be # scarves.

Write Equations:

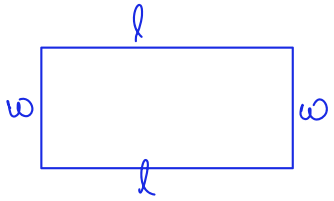
$$x + y = 110$$

Do not solve.

$$8x + 12y = 1112$$

3. The perimeter of a standard tennis court when used for doubles play is 228 ft. The width is 49 ft less than the length. Find the dimensions.

Define Variables: let the length be l and width be w.



Write Equations:

$$2l + 2w = 228$$
$$w = l - 49$$

Do not solve.

4. A nontoxic wood furniture polish can be made by mixing mineral (or olive) oil with vinegar. To make a 21-oz batch for a squirt bottle, Jazmyn uses an amount of mineral oil that is 3 oz more than twice the amount of vinegar. How much of each ingredient is required?

Define Variables: let mineral oil be x and vinegar be y.

Write Equations:

$$\left.\begin{aligned} x + y &= 21 \\ 2y + 3 &= x \end{aligned}\right\}$$

Do not solve.