Name: KEY Hour: ____________ Date: ____________

NOTES: Section 3.2 – Solve Linear Systems Algebraically

Goals: #1 - I can solve a system of linear equations using substitution.

#2 - I can solve a system of linear equations using elimination.

#3 - I can determine whether a system of equations has one, infinitely many, or no solutions when using substitution or elimination.

#4 - I can determine one method, substitution or elimination, works more conveniently than the other.

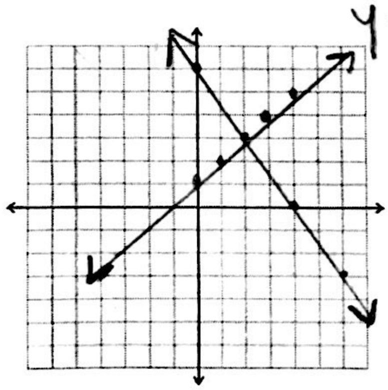
Homework: Lesson 3.2 Worksheet

Warm Up:

Solve the system of equations graphically. Then classify the system as *consistent and independent, consistent and dependent,* or *inconsistent.*

1. $3x + 2y = 12$ $\quad 2y = -3x + 12$ $\quad y = -\frac{3}{2}x + 6$

   $x - y = -1$ $\quad -y = -x - 1$ $\quad y = x + 1$

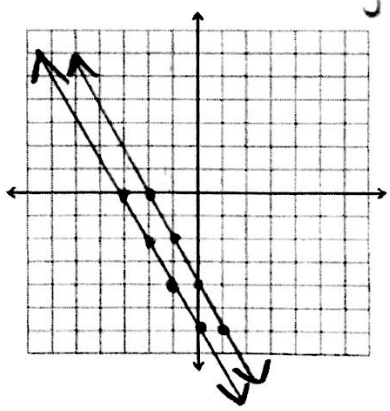


Solution: (2, 3)

Classify: consistent & independent

2. $4x + 2y = -8$ $\quad 2y = -4x - 8$ $\quad y = -2x - 4$

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



Solution: No Solution

Classify: inconsistent

Notes:

There are two algebraic methods for solving linear systems:

substitution and elimination

Name:______________________ Hour: __________ Date: __________

Example #1: Solve the system using the <u>substitution method</u>.

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

$x + 3y = 3$

$x + 3y = 3$

$x = 3 - 3y$

$2(3 - 3y) + 5y = -5$

$6 - 6y + 5y = -5$

$6 - y = -5$

$-y = -11$

$\boxed{y = 11}$

$x = 3 - 3(11)$

$x = 3 - 33$

$\boxed{x = -30}$

b. $x + 4y = 1$

$3x + 2y = -12$

$x + 4y = 1$

$x = 1 - 4y$

$3(1 - 4y) + 2y = -12$

$3 - 12y + 2y = -12$

$3 - 10y = -12$

$-10y = -15$

$\boxed{y = \frac{3}{2}}$

$x = 1 - 4\left(\frac{3}{2}\right)$

$\boxed{x = -5}$

Example #2: Solve the system using the <u>elimination method</u>.

a. $-2(3x - 7y = 10)$

$6\cancel{x} - 8y = 8$

$-6x + 14y = -20$

$6y = -12$

$\boxed{y = -2}$

$3x - 7(-2) = 10$

$3x + 14 = 10$

$3x = -4$

$\boxed{x = \frac{-4}{3}}$

b. $2(4x - 2y = -16)$

$-3x + 4\cancel{y} = 12$

$+ \; 8x - 4y = -32$

$5x = -20$

$\boxed{x = -4}$

$4(-4) - 2y = -16$

$-16 - 2y = -16$

$-2y = 0$

$\boxed{y = 0}$

Notes:

We can use either method when solving systems algebraically. In general,

- <u>Substitution</u> is convenient when one of the variables has a coefficient of <u>1</u> or <u>-1</u>.
- <u>Elimination</u> is convenient when *neither* variable has a coefficient of <u>1</u> or <u>-1</u>.

Name:________________ Hour: ________ Date: ________

Review:

We know that when we solve linear systems, we could have ONE solution, NO solution, or infinitely many solutions.

What does this look like algebraically?

ONE SOLUTION	NO SOLUTION	INFINITELY MANY SOLUTIONS
$x = \#$ $y = \#$ $(,)$	variables drop out $8 \neq 12$	$0 = 0$ ✓

Example #3: Solve the linear system.

a. $x - 2y = 4$

$3x - 6y = 8$

$x - 2y = 4$

$x = 4 + 2y$

$3(4 + 2y) - 6y = 8$

$12 + 6y - 6y = 8$

$12 \neq 8$

$\boxed{\text{no solution}}$

3.5

b. $(4x - 10y = 8)$

$-14x + 35y = -28$

$14x - 35y = 28$

$+\ -14x + 35y = -28$

$0 = 0$ ✓

$\boxed{\text{infinitely many solutions}}$

Name:______________________________ Hour: __________ Date: __________

Example #4: You need a 15% acid solution for your science experiment, but there's only 10% solution and 30% solution left. You decide to mix the 10% solution with the 30% solution to make your own 15% acid solution. You need a total of 10 liters of 15% solution for your science experiment. How many liters of the 10% solution and the 30% solution should you use?

x = # of liters of 10% solution

y = # of liters of 30% solution

$x + y = 10$

$.10x + .30y = .15(10)$

$.10x + .30y = 1.5$

$x = 10 - y$

$.10(10 - y) + .30y = 1.5$

$1 - .10y + .30y = 1.5$

$1 + .20y = 1.5$

$.20y = 0.5$

$y = 2.5$ liters of 30% solution

$x + 2.5 = 10$

$x = 7.5$ liters of 10% solution