Name__________________

Module #3: **Date ____________**

Worksheet 14c: *Solving Linear Systems of Equations: Addition (Elimination Method)*

View Tutorial 14a (covers worksheets 14a, b and c)

Objective: *Use the elimination method (addition & multiplication) in order to solve the system of equations.*

Elimination Method Using Addition and Subtraction:

In systems of equations where the coefficient (the number in front of the variable) of the x or y terms are additive inverses, solve the system by adding the equations. Because one of the variables is eliminated, this method is called **elimination**.

Example 2: Use elimination to solve the system of equations $x - 3y = 7$ and $3x + 3y = 9$.

Add the two equations. ⟹

$$\begin{array}{r} x - 3y = 7 \\ +\ \ 3x + 3y = 9 \\ \hline 4x \qquad = 16 \end{array}$$

$$\frac{4x}{4} = \frac{16}{4} \qquad x = 4$$

Substitute 4 for x in either original equation. Then solve for y. ⟹

$$\begin{array}{r} x - 3y = 7 \\ 4 - 3y = 7 \\ -3y = 3 \end{array}$$

$$\frac{-3y}{3} = \frac{3}{3} \qquad y = -1$$

The solution of this system is (4, -1).

Use elimination to solve each system of equations:

1. $2x + 2y = -2$
$3x - 2y = 12$

(___ , ___)

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

(___ , ___)

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

(___ , ___)

4. $6x + 5y = 4$
$6x - 7y = -20$

(,)

5. $2x - 3y = 12$
$4x + 3y = 24$

(,)

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Elimination Method Using Multiplication:

Some systems of equations cannot be solved simply by adding or subtracting the equations. One or both equations must first be multiplied by a number before the system can be solved by elimination. Consider the following example:

Example 3: Use elimination to solve the system of equations $x + 10y = 3$ and $4x + 5y = 5$.

$$\left.\begin{aligned} x + 10y &= 3 \\ 4x + 5y &= 5 \end{aligned}\right\}$$

Multiply $x + 10y = 3$ by –4. ⟹ $-4x - 40y = -12$
Then add the two equations. ⟹ $4x + 5y = 5$

$$-35y = -7$$
$$\frac{-35y}{-35} = \frac{-7}{-35} \qquad y = \frac{1}{5}$$

Substitute $\frac{1}{5}$ for y into either original equation. Then solve for y. ⟹

$$x + 10y = 3$$
$$x + 10\left(\frac{1}{5}\right) = 3$$
$$x + 2 = 3$$
$$x + 2 - 2 = 3 - 2 \qquad x = 1$$

The solution of this system is $(1, \frac{1}{5})$

Use elimination to solve each system of equations:

6. $3x + 2y = 0$
$x - 5y = 17$

(,)

7. $2x + 3y = 6$
$x + 2y = 5$

(,)

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

(,)

9. $4x + 5y = 6$
$6x - 7y = -20$

(,)

10. $4x + 2y = 8$
$16x - y = 14$

(,)