

# Key

Name \_\_\_\_\_

## Guided Notes - The Elimination Method

Objective: Use the elimination method to solve a system of equations.

1) What method was used to solve this system of equations?

$$y = x + 1$$

$$x + 2y = 5$$

$$x + 2y = 5$$

$$-x \quad -x$$

$$\frac{2y}{2} = \frac{-x}{2} + \frac{5}{2}$$

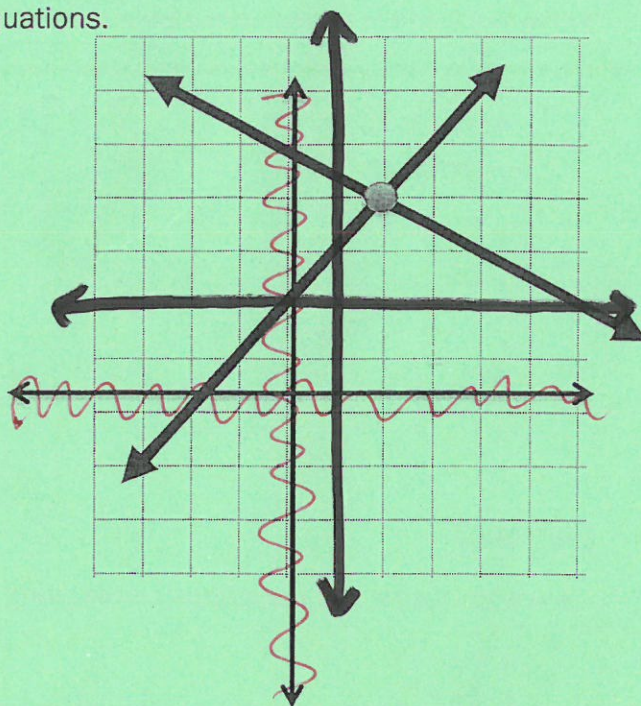
$$y = -\frac{1}{2}x + 2.5$$

Method used is \_\_\_\_\_

Graphing

Final answer \_\_\_\_\_

(1,2)



2) What method was used to solve this system of equations?

$$y = x + 1$$

$$x + 2y = 5$$

Method used is \_\_\_\_\_

Substitution

Final answer \_\_\_\_\_

(1,2)

$$x + 2(x + 1) = 5$$

$$x + 2x + 2 = 5$$

$$3x + 2 = 5$$

$$3x = 3$$

$$x = 1$$

$$y = 1 + 1$$

$$y = 2$$

One solution: (1,2)

Method 3 - The Elimination Method

STEP 1: Write your equations in standard form. x's, y's, and constants should be written under each other in columns.

STEP 2: Choose a variable to eliminate. You may have to multiply one or both equations by a constant so the variable you wish to eliminate has opposite coefficients.

STEP 3: Add the equations. One of your variables will be eliminated.

STEP 4: Solve for the remaining variable.

STEP 5: Substitute your answer from step 4 into any of the equations and solve for the other variable.

Example 1

$$-x + y = 1$$

$$x + 2y = 5$$

$$3y = 6$$

$$y = 2$$

$$x + 2(2) = 5$$

$$x = 1$$

(1,2)

### Example 2

Solve the system of equations below using the elimination method

$$\begin{array}{r} -x - 3y = -5 \\ x + 2y = 10 \end{array}$$

$$-y = 5$$

$$y = -5$$

$$x + 2(-5) = 10$$

$$x - 10 = 10$$

$$x = 20$$

$$(20, -5)$$

### Example 3

Solve the system of equations below using the elimination method

$$\begin{array}{r} x + y = -3 \\ x - y = 1 \end{array}$$

$$2x = -2$$

$$x = -1$$

$$-1 - y = 1$$

$$-y = 2$$

$$y = -2$$

$$(-1, -2)$$

Try these on your own

$$\begin{array}{r} 4x - 3y = 4 \\ 4x + 3y = 28 \end{array}$$

$$8x = 32$$

$$x = 4$$

$$4(4) - 3y = 4$$

$$16 - 3y = 4$$

$$-3y = -12$$

$$y = 4$$

$$(4, 4)$$

$$\begin{array}{r} 8x - 4y = 36 \\ 3x + 4y = -14 \end{array}$$

$$11x = 22$$

$$x = 2$$

$$8(2) - 4y = 36$$

$$16 - 4y = 36$$

$$-4y = 20$$

$$y = -5$$

$$(2, -5)$$

$$\begin{array}{r} -2x - 9y = -25 \\ 4x + 9y = 23 \end{array}$$

$$2x = -2$$

$$x = -1$$

$$-2(-1) - 9y = -25$$

$$-9y = -27$$

$$y = 3$$

$$(-1, 3)$$

Name Key

Guided Notes - The Elimination Method - Day 2

Objective: Use the elimination method to solve a system of equations

What if you have a system of equations that looks like this? Now what? *follow the same*

$$\begin{array}{l}
 \textcircled{1} \begin{cases} 5x + y = 9 \\ 10x - 7y = -18 \end{cases} \\
 \textcircled{2} \begin{array}{r} 35x + 7y = 63 \\ 10x - 7y = -18 \\ \hline 45x = 45 \end{array} \\
 \textcircled{3} \quad 45x = 45 \\
 \textcircled{4} \quad x = 1 \\
 \textcircled{5} \quad \begin{array}{l} 5(1) + y = 9 \\ y = 4 \end{array}
 \end{array}$$

$(1, 4)$

*5 step procedure.*

Example 2

$$\begin{array}{l}
 \textcircled{1} \begin{cases} -3x + 7y = -16 \\ -x + 5y = 16 \end{cases} \times (-3) \\
 \textcircled{2} \begin{array}{r} 9x - 21y = 48 \\ -9x + 5y = 16 \\ \hline -16y = 64 \end{array} \\
 \textcircled{3} \quad -16y = 64 \\
 \textcircled{4} \quad y = -4 \\
 \textcircled{5} \quad \begin{array}{l} -3x + 7(-4) = -16 \\ -3x = 12 \\ x = -4 \end{array}
 \end{array}$$

$(-4, -4)$

Example 3

$$\begin{array}{l}
 \textcircled{1} \begin{cases} 16x - 10y = 10 \\ -8x - 6y = 6 \end{cases} \times (2) \\
 \textcircled{2} \begin{array}{r} 16x - 10y = 10 \\ -16x - 12y = 12 \\ \hline -22y = 22 \end{array} \\
 \textcircled{3} \quad -22y = 22 \\
 \textcircled{4} \quad y = -1 \\
 \textcircled{5} \quad \begin{array}{l} 16x - 10(-1) = 10 \\ 16x = 0 \\ x = 0 \end{array}
 \end{array}$$

$(0, -1)$

Example 4

$$\begin{array}{l}
 \begin{cases} -7x - 8y = 9 \\ -4x + 9y = -22 \end{cases} \times 4 \quad \begin{cases} -63x - 72y = 81 \\ -32x + 72y = -176 \end{cases} \\
 \hline \\
 -95x = -95 \\
 x = 1 \\
 -7(1) - 8y = 9 \\
 -8y = 16 \\
 y = -2
 \end{array}$$

$(1, -2)$

Example 5

$$\begin{array}{l}
 \begin{cases} 5x + 4y = -14 \\ 3x + 6y = 6 \end{cases} \times 3 \\
 \times (-2) \\
 \begin{array}{r} 15x + 12y = -42 \\ -6x - 12y = -12 \\ \hline 9x = -54 \\ x = -6 \\ 5(-6) + 4y = -14 \\ 4y = 16 \\ y = 4 \end{array}
 \end{array}$$

$(-6, 4)$

Try these on your own:

$$\begin{cases} -4x - 2y = 14 & (7) \\ -10x + 7y = -25 & (2) \end{cases}$$

$$\begin{aligned} -28x - 14y &= 98 \\ -20x + 14y &= -50 \end{aligned}$$

$$\hline -48x = 48$$

$$x = -1$$

$$-4(-1) - 2y = 14$$

$$-2y = 10$$

$$y = -5$$

$$\begin{aligned} 5x - 6y &= 25 \\ (4x + 2y = 3) &(3) \end{aligned}$$

$$\hline 12x + 6y = 9$$

$$17x = 34$$

$$x = 2$$

$$10 - 6y = 25$$

$$-6y = 15$$

$$\boxed{(2, -2\frac{1}{2})} \quad y = \frac{15}{-6} = -2\frac{1}{2}$$

$$\begin{aligned} 3x + 8y &= -14 \\ x &= 2 \end{aligned}$$

$$3x + 8y = -14$$

$$(x + 10y = 2) \quad (-3)$$

$$-3x + 10y = -6$$

$$\hline 8y = -20$$

$$y = \frac{-20}{8}$$

$$\boxed{(2, -2\frac{1}{2})}$$

$$\begin{cases} 4x + 15y = 17 \\ -x + 5y = -13 \end{cases} \quad (4)$$

$$4x + 15y = 17$$

$$-4x + 20y = -52$$

$$\hline 35y = -35$$

$$y = -1$$

$$4x + 15(-1) = 17$$

$$4x = 32$$

$$x = 8$$

$$\begin{aligned} 3y &= -15 \\ x + y &= 10 \end{aligned}$$

$$y = -5$$

$$x - 5 = 10$$

$$x = 15$$

$$\boxed{(15, -5)}$$

$$\begin{cases} 2x - 7y = 9 & (3) \\ 4y - 3x = 6 \end{cases}$$

$$(-3x + 4y = 6) \quad (2)$$

$$6x - 21y = 27$$

$$-6x + 8y = 12$$

$$\hline -13y = 39$$

$$y = -3$$

$$2x + 21 = 9$$

$$2x = -12$$

$$x = -6$$

$$\boxed{(-6, -3)}$$

$$\begin{cases} 2x + 4y = -4 \\ 3x + 5y = -3 \end{cases} \quad (2)$$

$$-6x - 12y = 12$$

$$6x + 10y = -6$$

$$\hline -2y = 6$$

$$y = -3$$

$$2x + 4(-3) = -4$$

$$2x = 8$$

$$x = 4$$

$$\boxed{(4, -3)}$$

$$2x - 4y = 8$$

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

$$(-\frac{1}{2}x + y = 6) \quad (4)$$

$$-2x + 4y = 24$$

$$2x - 4y = 8$$

$$\hline 0 = 32$$

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

$$\begin{cases} \frac{1}{3}x - y = -1 & (3) \\ \frac{1}{5}x - \frac{2}{5}y = -1 \end{cases} \quad (-5)$$

$$x - 3y = -3$$

$$-x + 2y = 5$$

$$\hline -y = 2 \quad y = -2$$

$$-y = 2 \quad y = -2$$

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

$$\frac{1}{3}x = -3$$

$$x = -9$$

$$\boxed{(-9, -2)}$$