Key

Math 1

Name _____

Date _____

~~U3 L2 L4~~ **Solving Systems by Elimination** [redacted]

3-3

Elimination Method Part 1

- Goal: Add or subtract the functions from each other to eliminate one of the variables so that you can solve for the other variable.
- Write the solution as an **ordered pair**.

1. $\begin{cases} 2x + 3y = 15 \\ 4x - 3y = 3 \end{cases}$ **(3, 3)**

$6x = 18$

$x = 3$

$2 \cdot 3 + 3y = 15$

$3y = 9$

$y = 3$

2. $\begin{cases} 2x + 6y = 24 \\ -2x + 5y = -2 \end{cases}$ **(6, 2)**

$11y = 22$

$y = 2$

$2x + 6 \cdot 2 = 24$

$2x = 12$

$x = 6$

3. $\begin{cases} 5x + 8y = 35 \\ 5x - 4y = -25 \end{cases}$ **(-1, 5)**

$12y = 60$

$y = 5$

$5x + 8 \cdot 5 = 35$

$5x = -5$

$x = -1$

4. $\begin{cases} 6y + x = 10 \\ x + 3y = 7 \end{cases}$ [redacted] **(4, 1)**

$3y = 3$

$y = 1$

$x + 3 \cdot 1 = 7$

$x = 4$

5. $\begin{cases} 3x + 2y = 2 \\ ~~y + 8 = 3x~~ \\ -3x + y = -8 \end{cases}$ **(2, -2)**

$3y = -6$

$y = -2$

$3x + 2 \cdot -2 = 2$

$3x - 4 = 2$

$3x = 6$

$x = 2$

6. $3\begin{cases} 4x - y = 10 \\ 2x + 3y = 12 \end{cases}$ $\rightarrow$ $12x - 3y = 30$

$+ \; 2x + 3y = 12$

$14x = 42$

$x = 3$

~~$\frac{2}{3}$~~

$2 \cdot (3) + 3y = 12$

$3y = 6$

$y = 2$

(3, 2)

Key

Math 1

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~~U3-L2-14 Solving Systems by Elimination Activity Part 2~~

Date _____

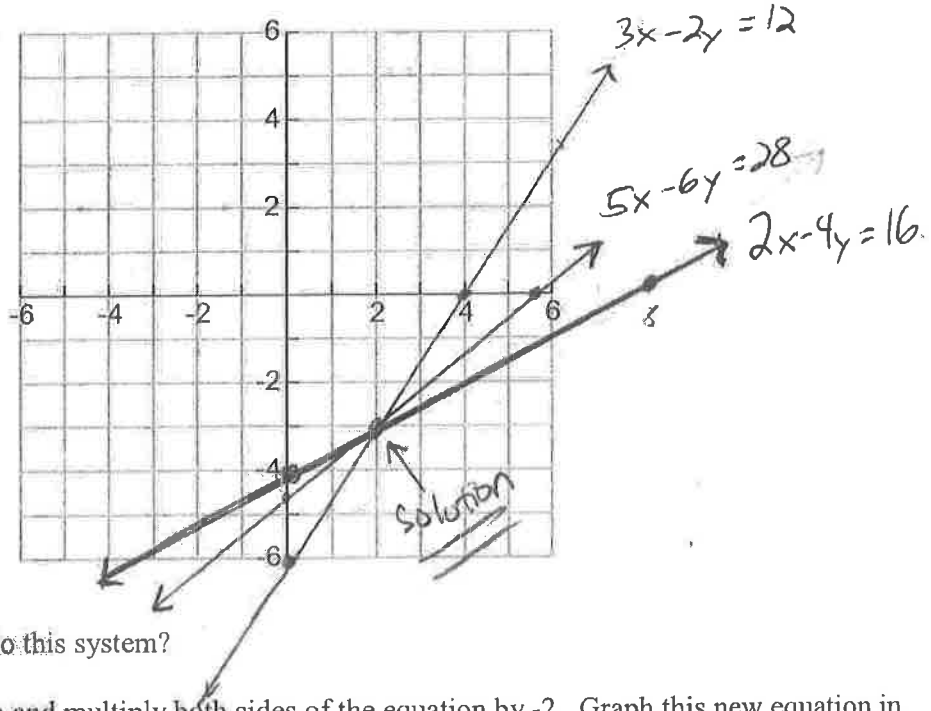
Elimination Part 2

1. Graph the following system on the below coordinate plane (graph quickly by finding the x- and y-intercepts). Graph each line in a different color.

★ $\begin{cases} 3x-2y=12 \\ 2x-4y=16 \end{cases}$

★ $3x-2y=12$ $x=(4,0), y=(0,-6)$

★ $2x-4y=16$ $x=(8,0); y=(0,-4)$



2. What is the solution to this system?

(2, -3)

3. Take the top equation and multiply both sides of the equation by -2. Graph this new equation in a new color.

$-2(3x-2y)=-2(12) \rightarrow$ $-6x+4y=-24$

4. What do you notice about the ~~equation~~ graph from number (3) and the graph of the original equation? Explain why this makes sense algebraically.

The graphs are the same since the equations are really the same thing. Multiplying BOTH sides by -2 keeps it balanced.

5. Add the two original equations from number (1) together. Graph the resulting equation in yet another color.

$$\begin{array}{rcl} 3x - 2y & = & 12 \\ +\ 2x - 4y & = & 16 \\ \hline \star\ 5x - 6y & = & 28 \end{array}$$

$x=(5.6,0)$ $y=(0,-4.6)$

6. What do you notice about the graph of your new equation from number (5) in relation to the graph of the system of equations from number (3)? *Think in terms of the solution to the original system.*

Goes right through the solution of original system.

7. Rewrite the original system of equations from number (1), only replace the top equation with

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7.) your equation from number (3). Write the new system below. Explain, based on your answer to number (4), why this replacement does not change the solution to the original system.

$\begin{cases} -6x + 4y = -24 \\ 2x - 4y = 16 \end{cases}$

The new equation is essentially the same as the old one, just multiplied by -2. Same graph, too.

8. Add the two equations in your system from number (7) just as you did in number (5). What happens? Why would this be helpful if you were trying to solve the system algebraically?

"y" terms cancel out. Now we can solve for x!

$-4x = -8$

9. Use your resulting equation in number (8) to solve the system algebraically (for both x and y – you will have to go back to the original system to solve for y)

$-4x = -8$

$x = 2$

$2 \cdot 2 - 4y = 16$

$4 - 4y = 16$

$-4y = 12$

$y = -3$

$(2, -3)$

Solution

10. Apply what you have learned in numbers 1 – 9 to try to solve the following system:

$-2\begin{cases} 5x + 3y = 13 \\ 7x + 6y = 11 \end{cases}$ → $-10x - 6y = -26$

$-3x = -15$

$x = 5$

$5(5) + 3y = 13$

$25 + 3y = 13$

$3y = -12$

$y = -4$

$(5, -4)$

Solve the following systems of equations using elimination.

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11. $\begin{cases} -2x+y=-15 \\ 4x+2y=10 \end{cases}$

$2(-2x+y=-15) \rightarrow -4x+2y=-30$

$4x+2y=10$

$-4x+2y=-30$

$4x+2y=10$

$4y=-20$

$y=-5$

$4x+2(-5)=10$

$4x-10=10$

$4x=20$

$x=5$

$(5,-5)$

12. $\begin{cases} 4x-2y=6 \\ x+y=3 \end{cases}$

$2(x+y=3) \rightarrow 2x+2y=6$

$6x=12$

$x=2$

$2+y=3$

$y=1$

$(2,1)$

13. $2(15x-3y=-9) \rightarrow 30x-6y=-18$

$3(2y-12x=-8) \rightarrow -36x+6y=-24$

$-6x=-42$

$x=7$

$2y-12(7)=-8$

$2y-84=-8$

$2y=76$

$y=38$

$(7,38)$

14. $\begin{cases} x+2y=2 \\ 5x-3y=-29 \end{cases}$ $-5(x+2y=2) \rightarrow -5x-10y=-10$

$(-4, 3)$

$-13y = -39$

$y = 3$

$x + 2(3) = 2$

$x + 6 = 2$

$x = -4$

15. $\begin{cases} 4x+5y=-14 \\ 8x+10y=-20 \end{cases}$ $-2(4x+5y=-14)$

$-8x-10y=28$

$0 = 8$ X

↓

This means there is no solution. The lines never intersect, meaning they are parallel.

16. $\begin{cases} 4x+3y=2.6 \\ 5x-2y=2.1 \end{cases}$ $5(4x+3y=2.6) \rightarrow 20x+15y=13$

$-4(5x-2y=2.1) \rightarrow -20x+8y=-8.4$

$(0.5, 0.2)$

$23y = 4.6$

$y = 0.2$

$4x + 3(0.2) = 2.6$

$4x + 0.6 = 2.6$

$4x = 2$

$x = 0.5$

17. $4\begin{cases}\frac{1}{4}x-y=-8\\ \frac{1}{2}x+4y=14\end{cases}$

$x-4y=-32$

$1.5x = -18$

$x = -12$

$\boxed{(-12, 5)}$

$\frac{1}{4}(-12) - y = -8$

$-3 - y = -8$

$-y = -5$

$y = 5$

18. $8(3x-4y=9) \rightarrow 24x-32y=72$

$-3(8x-10y=20) \rightarrow -24x+30y=-60$

$-2y = 12$

$y = -6$

$\boxed{(-5, -6)}$

$3x-4(-6)=9$

$3x+24=9$

$3x=-15$

$x=-5$

19. $-3\begin{cases}2x+3y=5\\ 6x+9y=15\end{cases}$

$-6x-9y=-15$

$0=0$ ✓

↓

This means the system has infinitely many solutions since both equations graph the exact same line, meaning they intersect @ every point.