

# Warmup 12/(Nisha's birthday)



**\*\*\*Make sure you have a whiteboard, marker, and eraser inside your desk\*\*\***

1. Solve using elimination: 
$$\begin{cases} 2x + y = 15 \\ x - y = 3 \end{cases}$$

$2(6) + y = 15$   
 $12 + y = 15$   
 $-12$   
 $y = 3$   
 $x = 6$
2. Explain why you would NOT want to add the equations together to solve the system 
$$\begin{cases} 3x - 4y = 18 \\ -5x + 2y = -2 \end{cases}$$
3. Instead of adding the equations together right away, what would be a good first step in the system from #2?  
Multiply the bottom equation by 2.

# Plan for the Week

- Monday: Finish Elimination
- Tuesday: Review all 3 methods of solving systems
- QUIZ WEDNESDAY OR THURSDAY
- Review for Midterm after that

# Warning:

- I **WILL NOT** be accepting the packet late. If you are not done by Friday, you will need to turn in what you have.

# MAIN STRATEGIES:

- **Graphing:** Graph both equations and see where they intersect!
- **Substitution:** If ( $y = \text{stuff}$ ), plug in the “stuff” for the  $y$  and go from there
- **Elimination:** Make sure you have opposite coefficients on a variable, then add the equations together

Don't write, just watch:

$$6a + b = 15 \longrightarrow 6a + b = 15$$

$$2(-3a + 4b = 6) \longrightarrow \underline{-6a + 8b = 12}$$

$$9b = 27$$

and the rest is the same...

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 5x - 2y = 1 \\ 4x + 4y = 12 \end{cases}$$

*Handwritten annotations:  $2x + 2y = 6$  above the second equation, and a horizontal line under the second equation.*

## What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 2(5x - 2y = 1) \\ 4x + 4y = 12 \end{cases} \rightarrow \begin{cases} 10x - 4y = 2 \\ 4x + 4y = 12 \end{cases}$$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 3x + 11y = -35 \\ -x + 3y = 5 \end{cases}$$



## What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

$$\bullet \begin{cases} 3x + 11y = -35 \\ 3(-x + 3y = 5) \end{cases} \rightarrow \begin{cases} 3x + 11y = -35 \\ -3x + 9y = 15 \end{cases}$$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} -4x + 2y = 18 \\ 12x - 2y = -34 \end{cases}$$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 3x + y = 2 \\ 3x - 2y = 32 \end{cases}$$

## What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

$$\bullet \begin{cases} 2(3x + y = 2) \\ 3x - 2y = 32 \end{cases} \rightarrow \begin{cases} 6x + 2y = 4 \\ 3x - 2y = 32 \end{cases}$$

## What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

$$\bullet \begin{cases} 3x + y = 2 \\ -1(3x - 2y = 32) \end{cases} \rightarrow \begin{cases} 3x + y = 2 \\ -3x + 2y = -32 \end{cases}$$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} x + 4y = 20 \\ x - 6y = 15 \end{cases}$$

## What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

$$\bullet \begin{cases} x + 4y = 20 \\ -1(x - 6y = 15) \end{cases} \rightarrow \begin{cases} x + 4y = 20 \\ -x + 6y = -15 \end{cases}$$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 2x + 4y = 8 \\ -3x - 3y = -9 \end{cases}$$



# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $\begin{cases} 3(2x + 4y = 8) \\ 2(-3x - 3y = -9) \end{cases} \rightarrow \begin{cases} 6x + 12y = 24 \\ -6x - 6y = -18 \end{cases}$

# What do you do when you CAN'T Eliminate right away???

- How could you make it so that you have opposite coefficients?

- $$\begin{cases} 5x + 2y = 8 \\ 4x - 5y = 13 \end{cases}$$

## Example: Multiplying One Equation

$$-2x + 4y = 8 \longrightarrow -2x + 4y = 8$$

$$4(3x - y = 3) \longrightarrow \underline{12x - 4y = 12}$$

$$10x = 20$$

$$x = 2$$

Find y:  $-2x + 4y = 8$

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

$$-4 + 4y = 8$$

$$4y = 12$$

$$y = 3$$

$$(2, 3)$$

Try it! (Notes or whiteboard)

$$\mathbf{x + 4y = 5}$$

$$\mathbf{x + 2y = 1}$$

## Example: Multiplying BOTH Equations

$$\begin{aligned} 3(-5x + 3y = 2) &\longrightarrow -15x + 9y = 6 \\ 5(3x - 2y = -2) &\longrightarrow \underline{15x - 10y = -10} \end{aligned}$$

$$-1y = -4$$

$$y = 4$$

Find x:  $3x - 2y = -2$

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

$$3x - 8 = -2$$

$$3x = 6$$

$$x = 2$$

**(2, 4)**

# Try these...

## No Multiplying

$$\begin{cases} x + y = 8 \\ -x + 5y = -20 \end{cases}$$

$$\frac{6y}{6} = \frac{-12}{6}$$

$$y = -2$$

$$-- (10, -2) --$$

$$x + (-2) = 8$$

$$+2 +2$$

$$x = 10$$

$$\boxed{(10, -2)}$$

## Multiplying One

$$\begin{cases} 4(3x + y = 3) \\ -4x - 4y = 12 \end{cases}$$

$$\rightarrow 12x + 4y = 12$$

$$\rightarrow -4x - 4y = 12$$

$$\frac{8x}{8} = \frac{24}{8}$$

$$(3, -6)$$

$$3(3) + y = 3$$

$$9 + y = 3$$

$$-9 \quad -9$$

$$y = -6$$

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

## Multiplying Both

$$\begin{cases} 4(-5x + 3y = 7) \\ 3(4x - 4y = -12) \end{cases}$$

$$-20x + 12y = 28$$

$$12x - 12y = -36$$

$$-(1, 4) = -8$$

$$x = 1$$

$$-5(1) + 3y = 7$$

$$-5 + 3y = 7$$

$$3x = 12 \quad x = 4$$

$$\boxed{(1, 4)}$$

# Story Problem!

- The sum of Nate & Anne's ages is 59. The difference of their ages is 5. Nate is older.
- a) Write a system of equations that represents this situation.
- b) Solve the system and say what the solution represents.

$$\begin{cases} N + A = 59 \\ N - A = 5 \end{cases}$$

$$N = 32, A = 27$$

Nate is 32 years old, Anne is 27 years old

# Story problem

- Henry gets paid for doing chores. Last week, he did 2 loads of laundry and 3 loads of dishes, and his parents paid him \$12. The week before, he did 7 loads of laundry and 6 loads of dishes, and his parents paid him \$33. How much does Henry earn for doing each type of chore?

$$\begin{array}{l} -2(2L + 3D = 12) \longrightarrow \\ 7L + 6D = 33 \longrightarrow \end{array} \left\{ \begin{array}{l} -4L - 6D = -24 \\ \underline{7L + 6D = 33} \\ 3L = 9 \end{array} \right.$$

$$\begin{aligned} 2(3) + 3D &= 12 \\ 6 + 3D &= 12 \\ 3D &= 6 \\ D &= 2 \end{aligned}$$

$$L = 3$$

Doing the laundry is \$3,  
doing the dishes is \$2.



# Story problem

- There are 14 total people at the Easter gathering – adults and children. Each child found 4 Easter eggs and each adult found 3 Easter eggs. All together, 48 eggs were found. How many adults and children were at the gathering?

$$\begin{aligned} -\begin{cases} 3(A + C = 14) \\ 3A + 4C = 48 \end{cases} &\longrightarrow \begin{cases} -3A - 3C = -42 \\ 3A + 4C = 48 \end{cases} \\ &C = 6 \\ &A = 8 \end{aligned}$$

There were 6 children and 8 adults.

# Homework

- Elimination Worksheet