Unit 2 2.4 **Solving Systems by Substitution Notes**

Objective – Solve a system of equations by using the substitution method. Students will see the link between graphing method and substitution to understand that solution is an ordered pair.

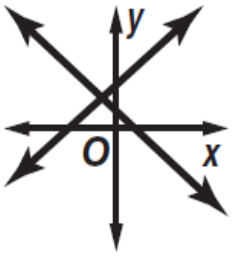
What is a system of equations?

How do we find solutions to systems of equations?

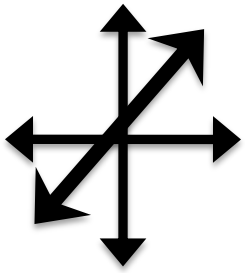
To solve a system of equations, we need to find a _____ and a _____ that satisfy both equations at the same time.

Method 1 - By _____

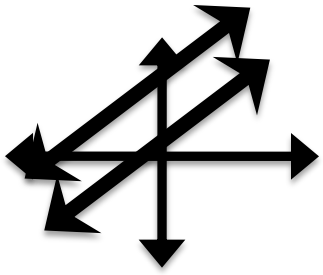
–The _____ of the two lines is the solution to the system.



_____ Solution



_____ Solutions



_____ Solution

In your own words, explain why we graph systems of equations.

Method 2 - By _____

STEP 1: Choose one equation and solve for one variable. You can solve for x or y.

STEP 2: Substitute your solution into the **other equation** and solve for the variable.

STEP 3: Substitute your solution from step 2 into the first equation and solve for the second variable.

STEP 4: Verify your solution.

$y = 3x$

$x + 2y = -21$

Example 2

STEP 1: Choose one equation and solve for one variable. You can solve for x or y.

STEP 2: Substitute your solution into the **other equation** and solve for the variable.

STEP 3: Substitute your solution from step 2 into the first equation and solve for the second variable.

STEP 4: Verify your solution.

$x + 5y = -3$

$3x - 2y = 8$

Example 3

Explain why substitution method would be a good method to use for this example. Then solve.

$4x + 5y = 8$

$3x - y = -13$

Try this one on your own

Directions - Solve the system of equations below using the substitution method

$x = 4y + 5$

$x = 3y - 2$

What about "*infinitely many*" and "*no solution*" systems of equations? Can you have those as possible solutions by using the substitution method? Explain.

Directions - Solve the system of equations below using the substitution method

$2x - y = -8$

$-2x + y = -3$

Directions - Solve the system of equations below using the substitution method

$6x - 2y = -4$

$-3x + y = 2$

Try these on your own.

Directions - Solve the system of equations below using the substitution method

$x - 3y = -9$

$-2x + y = -2$

Directions - Solve the system of equations below using the substitution method

$y = \frac{3}{5}x$

$3x - 5y = 15$

Why do we use the substitution method?

When is it best to use the substitution method?

Identify the systems of equations below that are best solved with the substitution method. Circle your answers.

1 $x = -1$ $4x + 2y = 12$	**2** $y - 3x = 6$ $-2x + 5y = 17$	**3** $5x + 3y = 10$ $2x - 3y = 4$
4 $2x - 4y = 12$ $7x + 2y = 10$	**5** $6x + 2y = 8$ $y = -2x$	**6** $8x - y = 8$ $x + y = 10$

Choose two of the problems from above. Solve one of them by graphing and solve the other by substitution.