**Solving Systems of Equations Algebraically**

A system of linear equations can be solved using graphs. You can also solve a system of linear equations using ALGEBRA.

**Substitution Method**

In this method, you REPLACE one variable with an expression that is equivalent to the other variable. This creates a one-variable equation that you can solve to find the value of the other variable.

Example 1

Solve this system of linear equations using substitution.

y = 2x – 1

2x + 2y = 10

**Strategy Replace the variable *y* using substitution.**

**Step 1** Write an equation that contains only one variable.

The first equation is solved for y. It shows that the expression 2x – 1 is equivalent to y.

So, substitute 2x – 1 for y in the second equation.

2x + 2y = 10

2x + 2(2x – 1) = 10

**Step 2** Solve that equation for x.

2x + 2(2x – 1) = 10

**Step 3** Substitute that value for x into one of the original equations. Solve for y.

The solution for this system of linear equations is ( , ).

**Step 4** Check the solution in each equation.

Remember that a system of linear equations may have one solution, no solutions, or infinitely many solutions.

Example 2

Solve this system of linear equations using substitution.

x = -5y – 39

x = -y – 3

**Examine each system of equations.**

**Which variable would you choose to substitute?**

**Why?**

**y = 4x - 9.6**

**y = -2x + 9**

**y = -3x**

**7x - y = 42**

**y = 4x + 1**

**x = 4y + 1**

Example 3

**Sometimes you need to rewrite one of the equations so that you can use the substitution method. For example:**

**The system:**

**3x -y = 5**

**2x + 5y = -8**

Your turn!

Solve the system of linear equations algebraically.

1.) y = -3 x – 5

y = x + 3

2.) y = 3x + 6

-6x + 2y = 12