## Systems of Equations (Substitution)

Aim: How do we use substitution to solve a system of linear equations?

➢ The substitution method is used to solve systems of linear equations by solving an equation for one variable and then substituting the resulting expression for that variable into the other equation.

Example1: Solve the system **graphically**:

$$y = 2x - 3 \qquad y = -2x + 5$$

Solution: _____
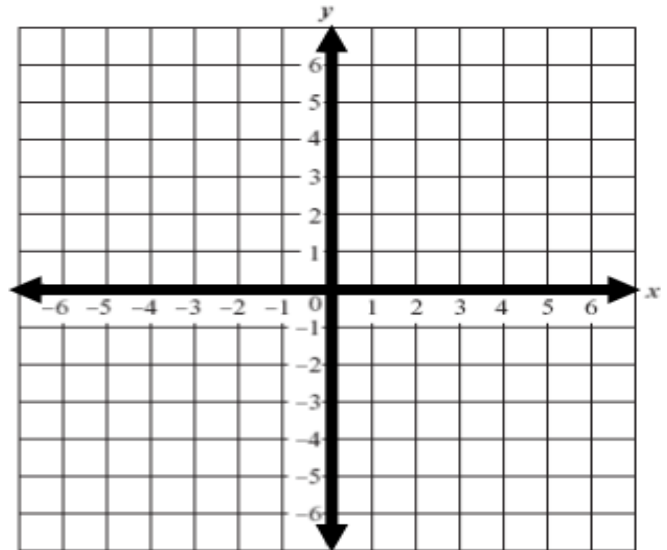
Solve the same system from above, **algebraically**:

$$y = 2x - 3$$

$$y = -2x + 5$$

Step 1: When both equations are y= or x=, set them equal to each other.

Step 2: Solve for the variable.

Step 3: Substitute the value that was found in step 2 into either equation to find the value of the other variable.

Step 4: Check your solution.
(2 equations means 2 checks)

Solution: _____

Hmmm… Did we get the **same solution** from graphing as we did using the substitution method?

Try it: Solve the system algebraically.

$$y = x + 2$$
$$y = 3x - 4$$

Step 1: When one equation is y= or x=, substitute it into the other equation.

Step 2: Solve for the variable.

Step 3: <u>Substitute</u> the value that was found in step 2 into either equation to find the value of the other variable.

Step 4: <u>Check</u> your solution.

Example 2: Solve the system algebraically.

a)   **y = 5**
      3x + 2y = 25

b)   **y = x – 3**
      2x + 3y = 16

Solution: _____

Solution: _____

Try It: Solve the system algebraically.

$$x = 2 - y$$
$$5x - 2y = 3$$

Step 1: Pick one equation to solve for one of the variables. (Get one equation to look like x = or y =)

Step 2: Substitute the expression into the variable in the other equation.

Step 3: Solve for variable.

Step 4: <u>Substitute</u> the value that was found in Step 3 into the other equation that wasn't used to find the other variable.

Step 5: Check your solution.

Example 3: Solve the system algebraically.

$$x - 2y = 5$$
$$3x - 5y = 8$$

Solution: _____

On Your Own: Solve each system of linear equations by substitution. Check your answers.

1. **x + 4y = 6**
    y = −x + 3

    Solution: _____

2. **x + 2y = 6**
    x − y = 3

    Solution: _____