7.2 LINEAR SYSTEMS

Learning Targets
1. Use elimination to solve a system of linear equations.
2. Tell whether or not a system of equations has 0, 1, or infinite solutions.

A third way to solve a system of linear equations is by a method called "elimination". The goal is to line up the variables and add the equations together so that one of the variables is eliminated.

Elimination works great when all the variables have coefficients other than 1 or –1.

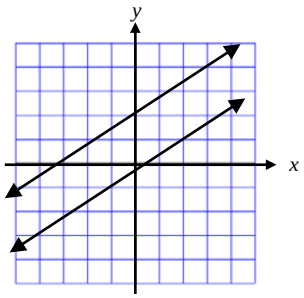
Example 1: Solve the system of equations by elimination: $4x-2y=7$
$x+2y=3$

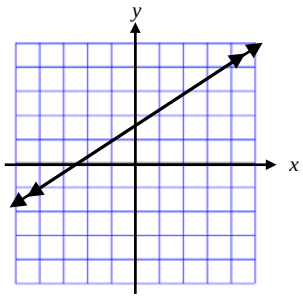
Example 2: Solve the system of equations by elimination: $3x+7y=15$
$5x+2y=-4$

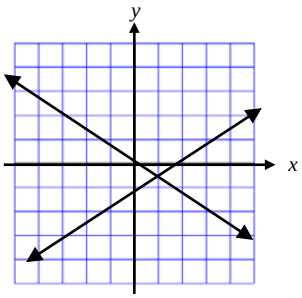
Example 3: Solve the system of equations by elimination: $2x-3y=-1$
$3x+4y=8$

Solving a system of equations does not always end up with a unique solution. Let's look at this graphically first.

Example 4: The graphs of 3 different systems of equations are shown below. How many solutions does each system have?







When you solve a system by elimination (or substitution) the following things might occur:

#1: You get a solution for one of the variables (and hence the other) creating <u>1 solution</u>.

#2: ALL the variables cancel out and you are left with something like …

… 5 = 5 … TRUE STATEMENT … MEANS you have <u>Infinite Solutions</u>.

… 0 = 7 … FALSE STATEMENT … MEANS you have <u>No Solutions</u>.

Example 5: Solve the system of equations $-3x+5y=7$
$6x-10y=-14$

Example 6: Solve the system of equations $-2x+4y=6$
$-3x+6y=8$