Name: _____   Date: _____

THE METHOD OF ELIMINATION
COMMON CORE ALGEBRA I

In previous courses you have seen how to solve systems **graphically** and how to solve them by **substitution**. Today's lesson will build on the previous one and formally introduce the technique of solving a system by **elimination**. Remember from the last lesson that:

SOLUTIONS TO SYSTEMS REMAIN SOLUTIONS IF

1. Properties of equality are used to rewrite either of the equations.

2. The equations are added or subtracted or any rewrite is added or subtracted.

Exercise #1: Consider the system shown below. Solve the system two ways, by eliminating x in (a) and eliminating y in (b).

(a) Eliminate x to solve

$$4x + 5y = 12$$

$$-2x + y = 8$$

(b) Eliminate y to solve

$$4x + 5y = 12$$

$$-2x + y = 8$$

(c) Show that the point that you found in (a) and (b) is a solution to this system of equations.

Exercise #2: Solve the following system of equations by elimination and check that your answer is a solution to this system.

$$5x - 2y = 10$$

$$2x + 7y = 43$$

There are many applications of solving systems of linear equations by elimination. One of the more interesting ones comes in finding the equation of a line if you know two points that it goes through.

Exercise #3: Consider a line that passes through the points $(-2, -11)$ and $(3, 14)$. We want to find its equation in $y = mx + b$ form.

(a) Substitute both of the known points into $y = mx + b$ to create a system of two equations with the parameter m and b.

(b) Solve this system for m and b and write the equation of the line.

Exercise #4: Find the equation of the linear function, in $y = mx + b$ form, shown in the table below.

x	−2	2	6	10
y	3	5	7	9

We will work extensively in the next lesson with modeling real world scenarios with systems and then solving those systems. But, here is a warm-up.

Exercise #4: Two numbers have the following properties. The sum of the larger and twice the smaller is equal to 13. Twice their positive difference is equal to eight. What are the two numbers? Play around with modeling this problem using variables. Create careful let statements and equations that translate the information you are given into a system you can solve.

Name: _____   Date: _____

THE METHOD OF ELIMINATION
COMMON CORE ALGEBRA I HOMEWORK

FLUENCY

1. Solve each of the following systems by the Method of Elimination. These two should be relatively easy. Make sure to understand why.

    (a) $x - y = 7$

    $x + y = 5$

    (b) $2x + 5y = 3$

    $-2x - y = 5$

2. Solve each of the following systems by the Method of Elimination. These will be slightly harder than #1 because you will have to alter one of the equations by multiplication.

    (a) $x - y = 15$

    $4x + 2y = 30$

    (b) $2x + 3y = 17$

    $5x + 6y = 32$

3. Solve each of the following systems by the Method of Elimination. In each case you will likely want to alter both equations by multiplication.

    (a) $2x + 3y = 16$

    $5x - 2y = 21$

    (b) $6x - 7y = 25$

    $15x + 3y = 42$

4. Which of the following represents the intersection of the lines whose equations are given below?

(1) $(-1, 16)$ (3) $(3, 8)$ $y + 2x = 14$

(2) $(4, 9)$ (4) $(0, 7)$ $y - x = 5$

APPLICATIONS

5. Use the Method of Elimination to find the equation of the line, in $y = mx + b$ form, that passes through each set of points. Set up a system first, like we did Exercises #3 and 4 from the lesson. Then, solve the system for the slope, m, and the y-intercept, b.

(a) $(3, 10)$ and $(5, 18)$ (b) $(-2, 5)$ and $(6, -7)$

6. Lilly and Rosie are sisters. The sum of their ages is 19 and the positive difference of their ages is 9. Set up a system of equations involving Lilly's age, L, and Rosie's age, R, assuming that Lilly is the older child. Solve the system to find their ages.

7. Shana bought sodas and popcorn for the movies. Sodas cost $3 each and popcorn cost $4 per bag. Shana bought 7 things from the concession, all either sodas or bags of popcorn. Shana spent a total of $26. Write a system of equations involving the number of sodas, s, and the bags of popcorn, b. Solve the system to see how many of each Shana bought.