

MA 110 SECTION 4.1: SYSTEMS OF LINEAR EQUATIONS
REVIEW: ELIMINATION METHOD

FINDING THE INTERSECTION POINT OF TWO LINES BY THE ELIMINATION METHOD:

Example: Solve the following system of equations.

$$3x + 9y = 45$$

$$2x + y = 10$$

STEP 1: Decide whether to eliminate the x or y variable. Usually you make this choice by seeing which variable's coefficients has the smaller LCM. The coefficients of x are 2 and 3 $\text{LCM}(2, 3) = 6$. The coefficients of y are 1 and 9 $\text{LCM}(1, 9) = 9$. So we will eliminate the x variable.

Multiply the top equation by 2 and the bottom equation by -3 , so that one coefficient of x is $+6$ and the other is -6 . You must make one coefficient positive and one negative for the variable you want to eliminate.

$$\begin{array}{l} 2(3x + 9y) = 2(45) \rightarrow 6x + 18y = 90 \\ -3(2x + y) = -3(10) \rightarrow -6x - 3y = -30 \end{array}$$

STEP 2: **ELIMINATE** one variable (in this case x), by adding the two equations.

$$15y = 60$$

STEP 3: Solve for the remaining variable (in this case y).

$$Y = 60/15 = 4$$

STEP 4: **SUBSTITUTE** into either original equation to find other coordinate of intersection point.

$$\begin{array}{ll} 3x + 9(4) = 45 & \text{or} \quad 2x + 4 = 10 \\ 3x + 36 = 45 & 2x = 6 \\ 3x = 9 & x = 3 \\ x = 3 & \end{array}$$

STEP 5: Write final answer.

The intersection point is (3, 4).

PRACTICE

Solve the following systems of equations using the **ELIMINATION METHOD**.

1.
$$\begin{aligned}x + 2y &= 12 \\2x + 3y &= 19\end{aligned}$$

2.
$$\begin{aligned}x + 3y &= 2 \\3x + 4y &= 1\end{aligned}$$

3.
$$\begin{aligned}y &= 2 - x \\2x - y &= 1\end{aligned}$$

4.
$$\begin{aligned}2x - 4y &= 8 \\5x - y &= 11\end{aligned}$$

ANSWERS

1. (2, 5) 2. (-1, 1) 3. (1, 1) 4. (2, -1)