

6.3 Part 1

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11:12 AM

6.3 Solving a Linear System by Elimination – Part 1

The **elimination method** is an algebraic method of finding the solution to a system of equations.

When using the elimination method the system of two linear equations is changed into a single equation with one variable.

Example 1 : Solve by elimination and check the answer. (Write the solution as an ordered pair)

$$\begin{array}{r} \textcircled{1} \quad 3x + 2y = 9 \\ \textcircled{2} \quad -3x - 5y = -15 \\ \hline 0x - 3y = -6 \\ -3y = -6 \\ \frac{-3y}{-3} = \frac{-6}{-3} \\ y = 2 \end{array}$$

$$\begin{array}{r} 3x + 2(\textcircled{2}) = 9 \\ 3x + 4 = 9 \\ \quad -4 \quad -4 \\ \hline 3x = 5 \\ \frac{3x}{3} = \frac{5}{3} \\ x = \frac{5}{3} \\ \left(\frac{5}{3}, 2\right) \end{array}$$

$$\begin{array}{l} \textcircled{1} \quad 3x + 2y = 9 \\ 3\left(\frac{5}{3}\right) + 2(2) = 9 \\ 5 + 4 = 9 \\ 9 = 9 \\ \checkmark \end{array}$$

$$\begin{array}{l} \textcircled{2} \quad -3x - 5y = -15 \\ -3\left(\frac{5}{3}\right) - 5(2) = -15 \\ -5 - 10 = -15 \\ -15 = -15 \\ \checkmark \end{array}$$

- ① Find a variable in which each equation has the same coefficient just different signs.
- ② Add the equations
- ③ Solve for the variable
- ④ Sub your value back into an equation
- ⑤ Verify

$$\begin{array}{l} \textcircled{1} 2x - 3y = 15 \\ \textcircled{2} 5x - 2y = 10 \end{array}$$

LCM for y's
LCM = 6

$$\textcircled{1} 2(2x) - 2(3y) = 2(15)$$

$$\textcircled{1} 4x - 6y = 30$$

$$\textcircled{2} -3(5x) - (-3)(2y) = (-3)(10)$$

$$\textcircled{2} -15x + 6y = -30$$

$$\textcircled{1} 4x - 6y = 30$$

$$\hline -11x + 0y = 0$$

$$-11x = 0$$

$$x = 0$$

① No matching variable coefficient! So pick a variable and create an LCM

$$\textcircled{1} 2x - 3y = 15$$

$$2(0) - 3y = 15$$

$$0 - 3y = 15$$

$$\underline{-3y = 15}$$

$$-3$$

$$y = -5$$

$$(0, -5)$$

$$\begin{array}{l} \textcircled{1} -5x - 3y = 11 \\ \textcircled{2} 4y = -4x - 12 \end{array}$$

LCM for x's is 20

$$\textcircled{2} 4x + 4y = -12$$

$$\textcircled{1} -5x - 3y = 11$$

$$\textcircled{2} (5)4x + (5)4y = (5)(-12)$$

$$\textcircled{2} 20x + 20y = -60$$

$$\textcircled{1} (4)(-5x) - 4(3y) = 4(11)$$

$$\textcircled{1} -20x - 12y = 44$$

$$\textcircled{2} 20x + 20y = -60$$

$$\textcircled{1} -20x - 12y = 44$$

$$\hline 0x + 8y = -16$$

$$\underline{8y = -16}$$

$$y = -2$$

$$\textcircled{1} -5x - 3y = 11$$

$$-5x - 3(-2) = 11$$

$$-5x + 6 = 11$$

$$\underline{-5x = 5}$$

$$x = -1$$

$$(-1, -2)$$

Practice : Worksheet 6.3

Mrs. Shaw

F & PC 10