

NAME: _____

Math _____, Period _____

Mr. Rogove

Date: _____

LEARNING OBJECTIVE: We will solve systems of equations by **elimination**.
(G8M4L25)

ACTIVATING PRIOR KNOWLEDGE:

We can add.

$\begin{array}{r} 2x + 5y = 7 \\ + 6x + 9y = 15 \\ \hline 8x + 14y = 22 \end{array}$ <p>Does $2+5+6+9 = 7+15$?</p>	$\begin{array}{r} -3 + 11 = 8 \\ + 3 + 2 = 5 \\ \hline 0 + 13 = 13 \end{array}$ <p>What happened to $-3 + 3$? Cancel out</p>
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CONCEPT DEVELOPMENT:

You can solve systems of equations by elimination by **adding** equations together to eliminate a variable.

Example:

$$\begin{array}{r} \{ 6x - 5y = 21 \\ + \{ 2x + 5y = -5 \\ \hline 8x + 0y = 16 \end{array}$$

STRATEGY: When to use Elimination Method

1. When the two coefficients of one of the variables are opposites. ^{P. 2} or the same.
2. When you can multiply one equation by an integer number to create a system where two coefficients of one of the variables are opposites.

P. 3

GUIDED PRACTICE:**Steps for Solving Equations Using Elimination**

1. Multiply one entire equation by an integer to create **opposite** coefficients for one of the variables (if necessary).
2. **Add** an entire equation in order to eliminate one variable.
3. Solve for your remaining variable.
4. Substitute your answer into one of the original equations and solve for the variable you eliminated originally.
5. Check your work by substituting your answers into the original equations.

$\begin{cases} 2x + y = 14 \\ 3x - y = 4 \end{cases}$ $+ \quad \begin{cases} 2x + y = 14 \\ 3x - y = 4 \end{cases}$ <hr/> $5x + 0y = 18$ $\frac{5x}{5} = \frac{18}{5}$ $x = \frac{18}{5}$ $2\left(\frac{18}{5}\right) + y = 14$ $\frac{36}{5} + y = \frac{70}{5}$ $-\frac{36}{5} \quad -\frac{36}{5}$ $y = \frac{34}{5}$ <p>CHECK</p> $3\left(\frac{18}{5}\right) - \frac{34}{5} = 4$ $\frac{54}{5} - \frac{34}{5} = \frac{20}{5}$ $\frac{20}{5} = \frac{20}{5}$ $\left(\frac{18}{5} \quad \frac{34}{5}\right)$	$\begin{cases} 2x + 3y = 11 \\ -2x + 9y = 4 \end{cases}$ $+ \quad \begin{cases} 2x + 3y = 11 \\ -2x + 9y = 4 \end{cases}$ <hr/> $0x + 12y = 15$ $\frac{12y}{12} = \frac{15}{12}$ $y = \frac{5}{4}$ $-2\left(\frac{29}{8}\right) + 9\left(\frac{5}{4}\right) = 4$ $-\frac{58}{8} + \frac{90}{8} = \frac{32}{8}$ $\frac{2x + \frac{15}{4}}{2} = \frac{44}{4}$ $-\frac{15}{4} \quad -\frac{15}{4}$ $\frac{2x}{2} = \frac{29}{2}$ $x = \frac{29}{2}$ $\left(\frac{29}{2}, \frac{5}{4}\right)$
$\begin{cases} 2x - 3y = 21 \\ 2x - y = 13 \end{cases}$ $- \quad \begin{cases} 2x - 3y = 21 \\ 2x - y = 13 \end{cases}$ <hr/> $0x - 2y = 8$ $-2y = 8$ $y = -4$ <p>CHECK</p> $2x - (-4) = 13$ $2x = 9$ $x = \frac{9}{2}$ $2\left(\frac{9}{2}\right) - 3(-4) = 21$ $9 + 12 = 21$	$\begin{cases} 5x + 18y = -27 \\ 2x + 18y = -9 \end{cases}$ $- \quad \begin{cases} 5x + 18y = -27 \\ 2x + 18y = -9 \end{cases}$ <hr/> $3x = -18$ $\frac{3x}{3} = \frac{-18}{3}$ $x = -6$ $y = \frac{1}{6}$

$\begin{cases} 12x - y = 26 \\ 6x - 3y = -36 \end{cases} \cdot \frac{1}{3}$ $\begin{cases} 12x - y = 26 \\ 2x - y = -12 \end{cases}$ $\begin{array}{r} 12x - y = 26 \\ -2x + y = 12 \\ \hline 10x - 2y = 38 \\ \frac{10x - 2y}{10} = \frac{38}{10} \\ \boxed{x = \frac{38}{10} = \frac{19}{5}} \end{array}$ $12\left(\frac{19}{5}\right) - y = 26$ $\frac{228}{5} - y = \frac{130}{5}$ $\frac{-228}{5} \quad \frac{-228}{5}$ $-y = \frac{-99}{5}$ $\boxed{y = \frac{99}{5}}$ <p>CHECK:</p> $6\left(\frac{19}{5}\right) - 3\left(\frac{99}{5}\right) = -36$ $\frac{114}{5} - \frac{297}{5} = \frac{-180}{5}$ $\frac{-180}{5} = \frac{-180}{5}$	$\begin{cases} 3x - 10y = -30 \\ 2x + 20y = 10 \end{cases} \div 2$ <p>Add equations to eliminate y!</p>
$\begin{cases} 2x + 5y = -10 \\ -5x + 4y = 4 \end{cases} \begin{matrix} 4 \\ 5 \end{matrix}$ $\begin{array}{r} 8x + 20y = -40 \\ -25x + 20y = 20 \\ \hline 33x + 0y = -60 \\ \frac{33x + 0y}{33} = \frac{-60}{33} \\ \boxed{x = -\frac{60}{33} = -\frac{20}{11}} \end{array}$ $2\left(-\frac{20}{11}\right) + 5y = -10$ $\frac{-40}{11} + 5y = \frac{-110}{11}$ $5y = \frac{-70}{11}$ $\boxed{y = -\frac{14}{11}}$	$\begin{cases} 7x - 4y = 13 \\ 6x + 3y = 11 \end{cases} \begin{matrix} 3 \\ 4 \end{matrix}$

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INDEPENDENT PRACTICE:

$$\begin{cases} 7x + 4y = 13 \\ 6x + 3y = 11 \end{cases}$$

$$\begin{cases} 3x - y = 21 \\ 10x - 3y = 11 \end{cases}$$

$$\begin{cases} 2x + y = 8 \\ x + y = 10 \end{cases}$$

$$\begin{cases} 8x - 5y = 10 \\ 3x + 5y = 12 \end{cases}$$

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CLOSURE:

Choose the most efficient method of solving each system: Substitution or Elimination and be ready to explain your decision. NO need to solve each system!

A. $\begin{cases} -3x + y = 13 \\ 2x - 3y = 16 \end{cases}$	Substitution or Elimination?
B. $\begin{cases} x = 4y + 12 \\ y = -5x + 81 \end{cases}$	Substitution or Elimination?
C. $\begin{cases} 16x + 13y = 134 \\ -4x - 12y = 2 \end{cases}$	Substitution or Elimination?

TEACHER NOTES:

Maps to lesson 28 from Module 4. HW could be handout (or Khan).