

4.3 – Solving Systems of Equations By Elimination

The "y" will eliminate each other.

ie: $\begin{cases} 2x+5y=10 \\ 3x-5y=20 \end{cases}$

Solving Systems By Elimination Method Steps

1.) This method is IDEAL for equations that are in Standard Form " $Ax+By=C$ "

2.) Arrange both equations on Top of each other and remember one thing.....

The Goal – To ELIMINATE a variable by either adding or subtracting the systems

- To eliminate by ADDING → SAME VARIABLE must have SAME coefficient and opposite signs
- To eliminate by SUBTRACTING → SAME VARIABLE must have SAME coefficient and SAME signs.
- To eliminate with NEITHER OPTIONS ABOVE → Multiply one or both eqns by a number that will CHANGE the coefficient(s) so you can ELIMINATE a variable.


3.) Should have an equation with only one variable → solve for that variable.

4.) Once found the value of one letter then SUBSTITUTE that value in any of the ORIGINAL equations

5.) Your solution (answer) should be an (x,y), but keep in mind special cases (inf many or no sol).
ordered pair

Example 1: Solve each system using the elimination method.

<p>a.) $\begin{cases} 5x-6y=-32 \\ 3x+6y=48 \end{cases}$</p>	<p>b.) $\begin{cases} 2x-3y=61 \\ 2x+y=-7 \end{cases}$</p>	<p>c.) $\begin{cases} 7x+15y=32 \\ x-3y=20 \end{cases}$</p>
<p><u>IDEAL</u> sys. of Eqn. to use <u>Elimination</u></p> <p>$5x-6y=-32$ $+ 3x+6y=48$ <hr/> $8x = 16$ $\frac{8x}{8} = \frac{16}{8}$ <u>Is only half of the solution!</u> $x=2$</p> <p>$3x+6y=48$ $3(2)+6y=48$ $6+6y=48$ -6 $6y=42$ $\frac{6y}{6} = \frac{42}{6}$ $y=7$</p> <p>(2, 7)</p>	<p>Want to <u>Eliminate</u> the "x" b/c same <u>coefficients!</u> <u>Multiply</u> through <u>ONE</u> eqn with <u>-1</u>.</p> <p>$2x-3y=61 \rightarrow 2x-3y=61$ $-1(2x+y=-7) \rightarrow -2x-y=7$ <hr/> $-4y=68$ $\frac{-4y}{-4} = \frac{68}{-4}$ $y=-17$</p> <p>$2x+y=-7$ $2x+(-17)=-7$ $2x-17=-7$ $+17+17$ $2x=10$ $\frac{2x}{2} = \frac{10}{2}$ $x=5$</p> <p>(5, -17)</p>	<p>Choose to <u>eliminate</u> the "y" b/c <u>opposite signs</u>. <u>Multiply</u> through the <u>bottom eqn</u> by <u>5</u>.</p> <p>$7x+15y=32 \rightarrow 7x+15y=32$ $5(x-3y=20) \rightarrow 5x-15y=100$ <hr/> $12x = 132$ $\frac{12x}{12} = \frac{132}{12}$ $x=11$</p> <p><u>*Pick an original equation*</u> $7x+15y=32$ $7(11)+15y=32$ $77+15y=32$ -77 $15y=-45$ $\frac{15y}{15} = \frac{-45}{15}$ $y=-3$</p> <p>(11, -3)</p>
<p>Consistent Independent sys. of equations</p>		

<p>d.) $\begin{cases} 8x - 20y = 40 \\ 2x - 5y = -15 \end{cases}$</p>	<p>e.) $\begin{cases} 7x + 8y = 25 \\ 9x + 10y = 35 \end{cases}$</p>	<p>f.) $\begin{cases} 4x + 2y = 14 \\ 7x - 3y = -8 \end{cases}$</p>
<p>To <u>eliminate</u>, multiply the bottom equation by a <u>-4</u>.</p> <hr/> <p>$8x - 20y = 40 \rightarrow 8x - 20y = 40$ $-4(2x - 5y = -15) \rightarrow -8x + 20y = 60$</p> <p style="text-align: center;">$0 = 100$ <u>NOT TRUE!</u></p>  <p>Inconsistent sys. of eqn.</p>	<p><i>(Faint handwritten work for problem e.)</i></p>	<p><i>(Faint handwritten work for problem f.)</i></p>

Example 2: Complete each problem. Make sure to find what the problem requests.

a.) Suppose your community center sells a total of 292 tickets for a basketball game. An adult ticket costs \$3 and a student ticket costs \$1. The sponsors collect \$470 in ticket sales. Find the number of adult tickets that were sold.

b.) Two groups of students order burritos and tacos at a local restaurant. One order of 3 burritos and 4 tacos costs \$11.33. The other order of 9 burritos and 5 tacos costs \$23.56. How much does a burrito and a taco cost?

(Faint handwritten notes and diagrams for the word problems, including equations like 3x + 4y = 11.33 and 9x + 5y = 23.56, and a small table with columns for burritos and tacos.)