Notes 3-1C Solving Systems of Equations Name_____

Period _____

Solving Systems of Equations by Elimination

Step 1: Write one equation under the other – aligning like variables & constants

Step 2: Multiply every term in one or both equations so that adding the 2 equations eliminates one of the variables.

Step 3: Solve for the remaining variable.

Step 4: Substitute that value into either equation to solve for the other variable.

Ex #1:

$\begin{cases} 3x + 2y = 4 \\ 4x - 2y = -18 \end{cases}$ +

$7x = -14$

$x = -2$

$3(-2) + 2y = 4$

$-6 + 2y = 4$

$+6 \quad +6$

$2y = 10$

$y = 5$

Solution: $(-2, 5)$

Ex #2:

$\begin{cases} 2x + y = 7 \\ 3x - y = -12 \end{cases}$ +

$5x = -5$

$x = -1$

Step 4:

$2x + y = 7$

$2(-1) + y = 7$

$-2 + y = 7$

$+2 \quad +2$

$y = 9$

Solution: $(-1, 9)$

Ex #3:

$2\{ -2x + y = 5 \Rightarrow -4x + 2y = 10$

$\{ 10x - 2y = -16 \quad + 10x - 2y = -16$

$6x = -6$

$x = -1$

Step 4:

$-2x + y = 5$

$-2(-1) + y = 5$

$2 + y = 5$

$-2 \quad -2$

$y = 3$

Solution: $(-1, 3)$

Ex #4:

$-4\{ 8x + y = 27 \Rightarrow -32x - 4y = -108$

$\{ -3x + 4y = 3 \quad + -3x + 4y = 3$

$-35x = -105$

$x = 3$

Step 4:

$8x + y = 27$

$8(3) + y = 27$

$24 + y = 27$

$-24 \quad -24$

$y = 3$

Solution: $(3, 3)$

Ex #5:

$$\begin{cases} 3x + 5y = -16 \\ 3y + 2x = -9 \end{cases}$$

$2(3x + 5y = -16) \Rightarrow 6x + 10y = -32$

$-3(2x + 3y = -9) \Rightarrow -6x - 9y = 27$

$y = -5$

$3x + 5y = -16$

$3x + 5(-5) = -16$

$3x - 25 = -16$

$+25 \quad +25$

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Solution: $(3, -5)$

Special Systems:

$$\begin{cases} y - 3x = 4 \\ 2y - 6x = 8 \end{cases}$$

$-2(y - 3x = 4) \Rightarrow -2y + 6x = -8$

$+ \quad 2y - 6x = 8$

$0 = 0$ true statement!

same line! Infinite solutions

$$\begin{cases} 2x - y = 3 \\ 4x - 2y = -12 \end{cases}$$

$-2(2x - y = 3) \Rightarrow -4x + 2y = -6$

$+ \quad 4x - 2y = -12$

$0 = -18$ false!

no solution

means lines parallel w/ dif. y intercepts

Word problems!

Ex: Marcus is thinking of two numbers whose sum is 89. Their difference is 11. What are the two numbers?

$x + y = 89$

$+ \quad x - y = 11$

$2x = 100$

$x = 50$

$x + y = 89$

$50 + y = 89$

$-50 \quad -50$

$y = 39$

Ex: To raise money for new uniforms, Hy-Line is selling t-shirts and hats. They spent $2000 purchasing the merchandise and brought in $3375 in total sales. How many t-shirts did they sell?

	Item	Cost	Sale price
x	T-shirt	$6	$10
y	hat	$4	$7

$-5(6x + 4y = 2000) \Rightarrow -30x - 20y = -10{,}000$

$3(10x + 7y = 3375) \quad 30x + 21y = 10{,}125$

$y = 125$

$y = 125$ hats sold

$x = 250$ + shirts sold

$6x + 4y = 2000$

$6x + 4(125) = 2000$

$6x + 500 = 2000$

$6x = 1500$

$x = \frac{1500}{6} = 250$