Notes 3-1B Solving Systems of Equations
Algebra II

Name _____

Period _____

Solving Systems of Equations by Substitution

step 1: one of the two equations must have an isolated variable
step 2: substitute its expression into the other equation.
step 3: solve for the remaining variable.
step 4: substitute that value into either equation to solve for the first variable.

Ex #1:

$$\begin{cases} y = 2x \\ 3x + y = 10 \end{cases}$$

$3x + 2x = 10$ → $y = 2x$

$5x = 10$

$x = 2$

$y = 2(2)$

$y = 4$

Solution: (2, 4)

Ex #2:

$$\begin{cases} x = -3y \\ 5x + 6y = -18 \end{cases}$$

$5(-3y) + 6y = -18$

$-15y + 6y = -18$

$-9y = -18$

$y = 2$

$x = -3y$

$x = -3(2)$

$x = -6$

Solution: (−6, 2)

Ex #3:

$$\begin{cases} -2x + y = -10 \\ 4x - 3y = 24 \end{cases}$$ → $y = 2x - 10$

$4x - 3(2x - 10) = 24$

$4x - 6x + 30 = 24$

$-2x + 30 = 24$

$-30 \quad -30$

$-2x = -6$

$x = 3$

$y = 2x - 10$

$y = 2(3) - 10$

$= 6 - 10$

$y = -4$

Solution: (3, −4)

Ex #4:

$$\begin{cases} y = 23 - x \\ 9x - 8y = 37 \end{cases}$$

$9x - 8(23 - x) = 37$

$9x - 184 + 8x = 37$

$17x - 184 = 37$

$\frac{17x}{17} = \frac{221}{17}$

$x = 13$

$y = 23 - x$

$y = 23 - 13$

$y = 10$

Solution: (13, 10)

Ex: #5:

$\begin{cases} y = x + 4 \\ y = 16 - 3x \end{cases}$

$x + 4 = 16 - 3x$

$+3x \quad +3x$

$4x + 4 = 16$

$-4 \quad -4$

$4x = 12$

$x = 3$

$y = x + 4$

$y = 3 + 4$

$y = 7$

Solution: $(3, 7)$

Ex #6:

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

$3x - 4 = 6x - 8$

$-6x \quad -6x$

$-3x - 4 = -8$

$+4 \quad +4$

$-3x = -4$

$\frac{-3x}{-3} = \frac{-4}{-3}$

$x = \frac{4}{3}$

$y = 3x - 4$

$y = 3\left(\frac{4}{3}\right) - 4$

$= 4 - 4$

$y = 0$

Solution: $\left(\frac{4}{3}, 0\right)$

Ex: Levi has a job offer in which he will receive \$800 per month plus a commission of 2% of the total price of the cars that he sells. At his current job, he receives \$1200 per month plus a commission of 1.5% of his total sales. How much must he sell per month to make the new job a better deal?

Job Offer: $y = \$800 + .02x$

Current Job: $y = \$1200 + .015x$

$2\% = .02$

y = salary

x = amt of sales

$800 + .02x = 1200 + .015x$

$-.015x \quad -.015x$

$800 + .005x = 1200$

$-800 \quad -800$

$\frac{.005x}{.005} = \frac{400}{.005}$

$x = \$80{,}000$

must sell more than \$80,000 per month to make new job better deal.