

Systems of Equations: Lesson 2

Substitution: Notes

Name: _____

Solve the system of equations:

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

$$\begin{array}{r} -x + 2 = 3x + 10 \\ +x \quad +x \\ \hline 2 = 4x + 10 \\ -10 \quad -10 \\ \hline -8 = 4x \\ \frac{-8}{4} = \frac{4x}{4} \quad x = -2 \end{array}$$

$$\begin{array}{l} y = -x + 2 \\ y = -(-2) + 2 \\ y = 2 + 2 \\ y = 4 \\ \begin{matrix} x & y \\ (-2, & 4) \end{matrix} \end{array}$$

Solve the system of equations:

$$\begin{cases} x = 3y + 8 \\ -2x - 5y = -5 \end{cases}$$

$$\begin{array}{r} -2(3y + 8) - 5y = -5 \\ -6y - 16 - 5y = -5 \\ -11y - 16 = -5 \\ +16 \quad +16 \\ \hline -11y = 11 \\ \frac{-11y}{-11} = \frac{11}{-11} \quad y = -1 \end{array}$$

$$\begin{array}{l} x = 3y + 8 \\ x = 3(-1) + 8 \\ x = -3 + 8 \\ x = 5 \\ \begin{matrix} x & y \\ (5, & -1) \end{matrix} \end{array}$$

Steps to solve systems by substitution:

1. Solve _____ one of the equations for either variable if necessary—pick a variable with a coefficient of 1 or -1.
2. Put that equation into the other equation—put it in parentheses
3. Solve _____ for the variable in your new equation.
4. Solve _____ for the other variable.

Solve by substitution: $\begin{cases} 4x - 5y = 2 \\ 2x - y = 4 \end{cases}$

①

$$\begin{array}{r} 2x - y = 4 \\ -2x \quad -2x \\ \hline y = -2x + 4 \\ y = 2x - 4 \end{array}$$

②

$$\begin{array}{r} 4x - 5y = 2 \\ 4x - 5(2x - 4) = 2 \\ 4x - 10x + 20 = 2 \\ -6x + 20 = 2 \\ \quad -20 \quad -20 \\ \hline -6x = -18 \\ \quad -6 \quad -6 \\ \hline x = 3 \end{array}$$

③

$$\begin{array}{r} y = 2x - 4 \\ y = 2(3) - 4 \\ y = 6 - 4 \\ y = 2 \\ (3, 2) \end{array}$$