What you will learn about:
Solving Systems of Linear Equations by Substitution

Solving System of Equations by Substitution

Solve a system of equations by substitution.

Step 1. Solve one of the equations for either variable.
Step 2. Substitute the expression from Step 1 into the other equation.
Step 3. Solve the resulting equation.
Step 4. Substitute the solution in Step 3 into one of the original equations to find the other variable.
Step 5. Write the solution as an ordered pair.
Step 6. Check that the ordered pair is a solution to **both** original equations.

Solve the system by Substitution. $\begin{cases} 2x + y = 7 \\ x - 2y = 6 \end{cases}$

Solve for x in bottom equation

$x - 2y = 6$

$x = 6 + 2y$

$x = 6 + 2(-1)$

$x = 4$

$(4, -1)$

$2(6+2y) + y = 7$

$12 + 4y + y = 7$

$12 + 5y = 7$

$5y = -5$

$y = -1$

Solve the system by Substitution. $\begin{cases} -7x - 2y = -13 \\ x - 2y = 11 \Rightarrow x = 11 + 2y \end{cases}$

$-7(11+2y) - 2y = -13$

$-77 - 14y - 2y = -13$

$-77 - 16y = -13$

$-16y = 64$

$y = -4$

$x = 11 + 2(-4)$

$= 3$

$(3, -4)$

Solve the system by Substitution. $\begin{cases} -5x + y = -3 \Rightarrow y = -3 + 5x \\ 3x - 8y = 24 \end{cases}$

$3x - 8(-3 + 5x) = 24$

$3x + 24 - 40x = 24$

$-37x + 24 = 24$

$-37x = 0$

$x = 0$

$y = -3 + 5(0)$

$y = -3$

$(0, -3)$

$$\begin{array}{r} 7 \\ 19 \\ \times\ 8 \\ \hline 152 \end{array}$$

$$43\overline{)172}\quad 4$$
$$172$$

Solve the system by Substitution. $\begin{cases} -3x - 8y = 20 \\ -5x + y = 19 \end{cases} \Rightarrow y = 19 + 5x$

$-3x - 8(19+5x) = 20$

$-3x - 152 - 40x = 20$

$-43x - 152 = 20$

$-43x = 172$

$x = -4$

$y = 19 + 5(-4)$

$19 - 20$

$y = -1$

$(-4, -1)$

☆ Solve the system by Substitution. $\begin{cases} -2x + 6y = 6 \\ -7x + 8y = -5 \end{cases} \Rightarrow \frac{-2x}{-2} = \frac{6 - 6y}{-2}$

$x = -3 + 3y$

$-7(-3+3y) + 8y = -5$

$21 - 21y + 8y = -5$

$21 - 13y = -5$

$-13y = -26$

$y = 2$

$x = -3 + 3(2)$

$x = -3 + 6$

$x = 3$

$(3, 2)$

Solve the system by Substitution. $\begin{cases} 2x + y = 7 \\ x - 2y = 6 \end{cases} \Rightarrow y = 7 - 2x$

$x - 2(7-2x) = 6$

$x - 14 + 4x = 6$

$5x - 14 = 6$

$5x = 20$

$x = 4$

$y = 7 - 2(4)$

$7 - 8$

$y = -1$

$(4, -1)$

Solve the system by Substitution. $\begin{cases} y = 6x - 11 \\ -2x - y = -7 \end{cases}$

$-2x - (6x - 11) = -7$

$-2x - 6x + 11 = -7$

$-8x = -18$

$x = \frac{18}{8} = \frac{9}{4}$

$y = 6\left(\frac{9}{4}\right) - 11$

$= \frac{54}{4} - \frac{44}{4}$

$= \frac{10}{4} = \frac{5}{2}$

$\left(\frac{9}{4}, \frac{5}{2}\right)$

Solve the system by Substitution. $\begin{cases} y = -3x + 5 \\ 5x - 4y = -3 \end{cases}$

$5x - 4(-3x + 5) = -3$

$5x + 12x - 20 = -3$

$17x - 20 = -3$

$17x = 17$

$x = 1$

$y = -3(1) + 5$

$= -3 + 5$

$= 2$

$(1, 2)$

Solve the system by Substitution. $\begin{cases} y = -2 \\ 4x - 3y = 18 \end{cases}$

$4x - 3(-2) = 18$

$4x + 6 = 18$

$4x = 12$

$x = 3$

$(3, -2)$

Solve the system by Substitution. $\begin{cases} 2x + y = 7 \\ x - 2y = 6 \end{cases}$

$x = 6 + 2y$

$2(6 + 2y) + y = 7$

$12 + 4y + y = 7$

$12 + 5y = 7$

$5y = -5$

$y = -1$

$x = 6 + 2(-1)$

$x = 4$

$(4, -1)$

Solve the system by Substitution. $\begin{cases} y = 2x + 1 \\ y = -3x - 6 \end{cases}$

Solve the system by Substitution. $\begin{cases} y = -2x + 5 \\ y = \frac{1}{2}x \end{cases}$