

7.4 Using a Substitution Strategy to Solve a System of Linear Equations

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10:51 AM

Use algebra to determine an exact solution to solve linear equations called **solving by substitution**

Ex#1 Solve this linear system

$$\begin{aligned} \textcircled{1} \quad & 5x - 3y = 18 \\ \textcircled{2} \quad & 4x - 6y = 18 \end{aligned}$$

METHOD 1

$$\begin{aligned} \textcircled{1} \quad & 5x - 3y = 18 \\ & +3y \quad +3y \\ \hline & 5x = 18 + 3y \\ & \frac{5x}{5} = \frac{18}{5} + \frac{3y}{5} \\ & x = 3.6 + 0.6y \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & 4x - 6y = 18 \\ & 4(3.6 + 0.6y) - 6y = 18 \\ & 14.4 + 2.4y - 6y = 18 \\ & -4y \quad \quad \quad -14.4 \\ \hline & -3.6y = 3.6 \\ & \frac{-3.6y}{-3.6} = \frac{3.6}{-3.6} \\ & y = -1 \end{aligned}$$

$$\begin{aligned} \textcircled{1} \quad & 5x - 3y = 18 \\ & 5x - 3(-1) = 18 \\ & 5x + 3 = 18 \\ & -3 \quad -3 \\ \hline & 5x = 15 \\ & \frac{5x}{5} = \frac{15}{5} \\ & x = 3 \end{aligned}$$

METHOD 2

$$\begin{aligned} \textcircled{2} \quad & 4x - 6y = 18 \\ & 4x + 2(-3y) = 18 \end{aligned} \quad \begin{array}{l} * \text{ change } -6y \\ \text{ to } -3y \times 2 \end{array}$$

solve equation $\textcircled{1}$ for $-3y$

$$\begin{aligned} \textcircled{1} \quad & 5x - 3y = 18 \\ & -5x \quad -5x \\ \hline & -3y = 18 - 5x \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad & 4x + 2(-3y) = 18 \\ & 4x + 2(18 - 5x) = 18 \\ & 4x + 36 - 10x = 18 \\ & -36 \quad -36 \\ \hline & -6x = -18 \\ & \frac{-6x}{-6} = \frac{-18}{-6} \\ & x = 3 \end{aligned}$$

$$\begin{aligned} \textcircled{1} \quad & 5x - 3y = 18 \\ & 5(3) - 3y = 18 \\ & 15 - 3y = 18 \end{aligned}$$

$$\cancel{5}x = 5$$

$$x = 3$$

$$\boxed{(3, -1)}$$

$$\cancel{15}x - 3y = 18$$

$$\cancel{-3}y = -3$$

$$y = -1$$

$$\boxed{(3, -1)}$$

pg. 425 #4-9, 19 (every other letter)