Solving Linear Systems by Substitution

You can use Substitution to solve a system of equations if one of the equations is already Solved for a variable.

Example One: *When one equation is solved for a variable.*

(1) Choose one equation that is solved for x or y.

$5x + 2y = 9$

$y = (x + 8)$

Solved for y

Substitute (x+8) in for y

(2) Substitute the expression into the other equation and solve.

$5x + 2y = 9$

$5x + 2(x+8) = 9$

$5x + 2x + 16 = 9$

$7x + 16 = 9$

$-16 \quad -16$

$7x = -7$

$\frac{7x}{7} = \frac{-7}{7}$

$x = -1$

(3) Substitute the value found in step (2) to find the other variable.

Find y-value

$y = x + 8$

$y = (-1) + 8$

$y = 7$

* Can substitute in either equation.

Solution: (-1, 7)

Example Two: *When neither equation is solved for a variable.*

(1) Choose one equation and solve for x or y.

$2x + (y) = -1$

$(-x) + y = -7$

$+x \quad +x$

$y = (x - 7)$

Substitute

(2) Substitute the expression into the other equation and solve.

$2x + y = -1$

$2x + (x-7) = -1$

$3x - 7 = -1$

$+7 \quad +7$

$\frac{3x}{3} = \frac{6}{3}$

$x = 2$

(3) Substitute the value found in step (2) to find the other variable.

Find y-value

$y = x - 7$

$y = (2) - 7$

$y = -5$

Solution: (2, -5)