

Solving Systems of Linear Equations (Substitution)



Level 1 - Solve a system of equations by substituting one into another

Level 2 - Rearrange an equation in order to solve a system by substitution

When two equations share the same variables, they form a system of equations. Solving the system means finding the values of the variables that make both equations true.

The substitution method works by **replacing one variable in an equation with an equivalent expression from another equation**. This reduces the system to a single equation that you can solve for one variable. Once you find that value, you substitute it back to find the other variable.

Example #1	Example #2
$\begin{cases} 3x + y = 11 \\ y = 2x + 1 \end{cases}$	$\begin{cases} 2x - 3y = -14 \\ 4x + y = 14 \end{cases}$
<p>substitute the second equation into the first to eliminate the y:</p> $3x + (2x + 1) = 11$ $5x + 1 = 11$ $5x = 10$ $x = 2$ <p>substitute back into either equation and solve for y:</p> $y = 2(2) + 1$ $y = 5$ <p>Solution: (2, 5)</p>	<p>rearrange the second equation:</p> $\begin{cases} 2x - 3y = -6 \\ y = 14 - 4x \end{cases}$ <p>substitute:</p> $2x - 3(14 - 4x) = -6$ <p>expand and simplify:</p> $2x - 42 + 12x = -6$ $14x - 42 = -14$ $14x = 28$ $x = 2$ <p>substitute back in:</p> $y = 14 - 4(2)$ $y = 6$ <p>Solution: (2, 6)</p>

Remember:

- Always isolate one variable first (like $y = 2x + 3$) before substituting.
- Use parentheses when substituting to avoid sign errors.
- Check your solution by plugging both values back into the original equations to ensure they're true.