Solve a Simultaneous System by Elimination

A simultaneous system is a set of equations that must be true at the same time. Elimination combines equations so one variable cancels; substitution then finds the remaining value. The solution is an ordered pair that satisfies every original equation. This example checks both equations independently.

FORMULA
If A = B and C = D, then A + C = B + D. Choose a multiple that makes opposite coefficients cancel.

WORKED EXAMPLE

Solve 2x + 3y = 12 and 4x − 3y = 6.

1. Add the equations

The y-coefficients are opposites, so adding the equations eliminates y.

(2x + 3y) + (4x − 3y) = 12 + 6; therefore 6x = 18

2. Solve for x

Divide both sides by 6.

x = 18 ÷ 6 = 3

3. Substitute to find y

Put x = 3 into the first equation and solve for y.

2(3) + 3y = 12; therefore 3y = 6; so y = 2

4. Write the ordered pair

List x first and y second.

(x, y) = (3, 2)

ANSWER

(x, y) = (3, 2)

Elimination gives x = 3; back-substitution gives y = 2.

CHECK

Check both equations: 2(3) + 3(2) = 12, and 4(3) − 3(2) = 6. Both are true.