



two equations, two unknowns, and four routes to the pair that satisfies both

One equation

$$2x + 3y = 12$$

endlessly many solutions, a whole line of them

→
then

A second equation

$$x - y = 1$$

a second line, cutting across the first

→
then

The solution

$$x = 3, y = 2$$

the one pair lying on both lines at once

a single linear equation in two unknowns cannot be solved on its own. It takes a second, independent equation to pin the pair down to one point

The standard form and what it means

- the standard form is $ax + by + c = 0$, with a and b not both zero and each variable to the first power only
- a **solution** is an ordered pair (x, y) that makes the equation true, and one equation has infinitely many
- drawing the pairs of one equation gives a **straight line**, which is where the word linear comes from
- two equations taken together form a simultaneous pair, and solving them means finding the pair satisfying both
- geometrically that is the **point where the two lines meet**, so the algebra and the picture are the same question

Four ways to solve a pair *

Elimination

multiply one or both equations so a variable has the **same coefficient**, then add or subtract to remove it. Usually the fastest, especially when coefficients are small

Substitution

make one variable the **subject** of one equation and put that expression into the other. Best when a coefficient is already 1

Cross multiplication

apply the formula to a , b and c directly. Quick when the numbers are awkward, but the **arrangement must be exact** or every term goes wrong

Graphical

plot both lines and read off the crossing. Asked for by name, and it is the only method that **shows** why a pair may have no solution or infinitely many

if a method is not named in the question, choose elimination first and substitution when one coefficient is already 1. Both are quicker and safer than the formula

