



Two equations at once

Where do the lines meet?

- Today: the answer is a PLACE, so it needs two numbers.

A system

- $x + y = 10$
- $x - y = 4$

Find the pair (x, y) that works in BOTH.

Graphically: the crossing point

- Each equation is a line.
- They cross at exactly one point: $(7, 3)$.

The solution is that point, not one of its numbers.

Algebraically: eliminate

- Add them: $2x = 14$, so $x = 7$.
- Then $y = 10 - 7 = 3$.

Two steps, because there are two unknowns.

Check in BOTH

• $7 + 3 = 10 \checkmark$ $7 - 3 = 4 \checkmark$

(6,4) passes the first and fails the second. One check is no check.

Parallel lines never meet

- $y = 2x + 1$ and $y = 2x + 5$.
- Equate: $1 = 5$. False.

NO solution. Same signal as one-variable equations.

Or the same line twice

- $y = 3x - 2$ and $2y = 6x - 4$.
- Halve the second: identical.

They meet EVERYWHERE. Infinitely many solutions.

Your turn

- $2x + y = 11$ and $x - y = 1$.

Solve it, then check the point in both equations.