Solving by Elimination

Line the equations up, make one variable's coefficients opposites (multiply if needed), add so it cancels, solve the one-variable equation, back-substitute, check in both.

1 THE VOCABULARY
Words we use

Elimination add the equations so a variable cancels (linear combination).

Opposite coefficients like 3 and –3: additive inverses, they add to 0.

Multiply an equation both sides, every term (Unit 1), to make opposites.

Make a zero appear the Unit 1, Lesson 1 idea, now with whole terms.

Choose the method graph to see, substitute when a variable is alone, eliminate when coefficients line up.

- Watch out for these.
- Multiplying only one side, or only one term. The whole equation, both sides.
- Adding when the coefficients are equal, not opposite. Subtract, or multiply one by –1 first.
- Forgetting the second variable. Back-substitute.
- Not checking the pair in both originals.

2 THE METHOD
The five steps

1. LINE THEM UP x over x, y over y, numbers over numbers.
2. MAKE OPPOSITES multiply one or both equations so one variable's coefficients are opposites.
3. ADD that variable's terms add to 0 and disappear.
4. SOLVE one variable: Unit 1.
5. BACK-SUBSTITUTE AND CHECK either original gives the other variable; check the pair in both.

WHY ADDING IS ALLOWED

Each equation says its two sides are equal. Adding equal things to equal things keeps them equal, so the sum is a true equation too, and the solution point satisfies it.

3 MULTIPLY BOTH
2x + 3y = 8 and 3x + 2y = 7

aim: x coefficients 6 and –6	step 2: choose a variable and the multipliers
6x + 9y = 24	the first, times 3
–6x – 4y = –14	the second, times –2
5y = 10, so y = 2	add: the x terms make a zero; solve
2x + 3(2) = 8, so x = 1	back-substitute into the first original
check: 2 + 6 = 8; 3 + 4 = 7	both true. (1, 2)

WHICH METHOD?

y = 4x – 1 with 2x + y = 11: substitution (y is alone). 5x + 2y = 9 with 3x – 2y = 7: elimination (2y and –2y already). To see roughly: graph.

SAY IT OUT LOUD

Line up, make opposites, add, solve, back-substitute, check both.