Solving Two Equations at the Same Time

KS4 MATHEMATICS ALGEBRA Ages 13-16 ⏰ 3 min read

What Are Simultaneous Equations?

Simultaneous equations are two or more maths puzzles that are linked together. Each puzzle has two **unknown numbers** (usually written as **x** and **y**), and you need to find what both numbers are. The trick is that both equations must be true at the same time — that's where the word "simultaneous" comes from.

For example, you might have two equations like: **x + y = 10** and **2x + y = 16**. Your job is to find the exact numbers for **x** and **y** that make both equations work.

Think of it like: You're trying to find out the price of apples and oranges. Someone tells you "an apple plus an orange costs £3." Another person says "two apples plus an orange costs £5." You need both clues together to work out how much each fruit costs.

The Substitution Method

One way to solve simultaneous equations is called the **substitution method**. First, rearrange one equation to show what **x** equals (or what **y** equals). Then, substitute that answer into the other equation. This leaves you with just one unknown number to solve for.

For example, if **x + y = 10**, you can write **x = 10 - y**. Now replace **x** in the second equation with **10 - y**, which gives you **2(10 - y) + y = 16**. Solve this, and you'll find **y**. Then you can find **x**.

The Elimination Method

The **elimination method** is another powerful technique. The idea is to add or subtract the two equations to make one of the unknown numbers disappear (get eliminated).

Look at your two equations and decide: can I multiply one or both by a number so that one of the unknowns matches? If the second equation is **2x + y = 16** and the first is **x**

+ y = 10, you could subtract the first from the second. The **y** values cancel out, leaving you with just **x**.

Think of it like: You have two bags of sweets. Both bags contain the same number of red sweets. If you take one bag away from the other, the red sweets cancel out and you're left counting only the blue ones.

Why Does This Matter?

Solving simultaneous equations is a superpower in maths and science. Engineers use them to design bridges, economists use them to predict prices, and programmers use them to solve real-world problems. When you master this skill, you'll be able to tackle much harder puzzles in your future maths classes.