ADDITION ALGORITHMS

What does **addition** really mean? Is the way you learned to add the only way to do it? Do we all have to solve problems the same way?

Consider the following:

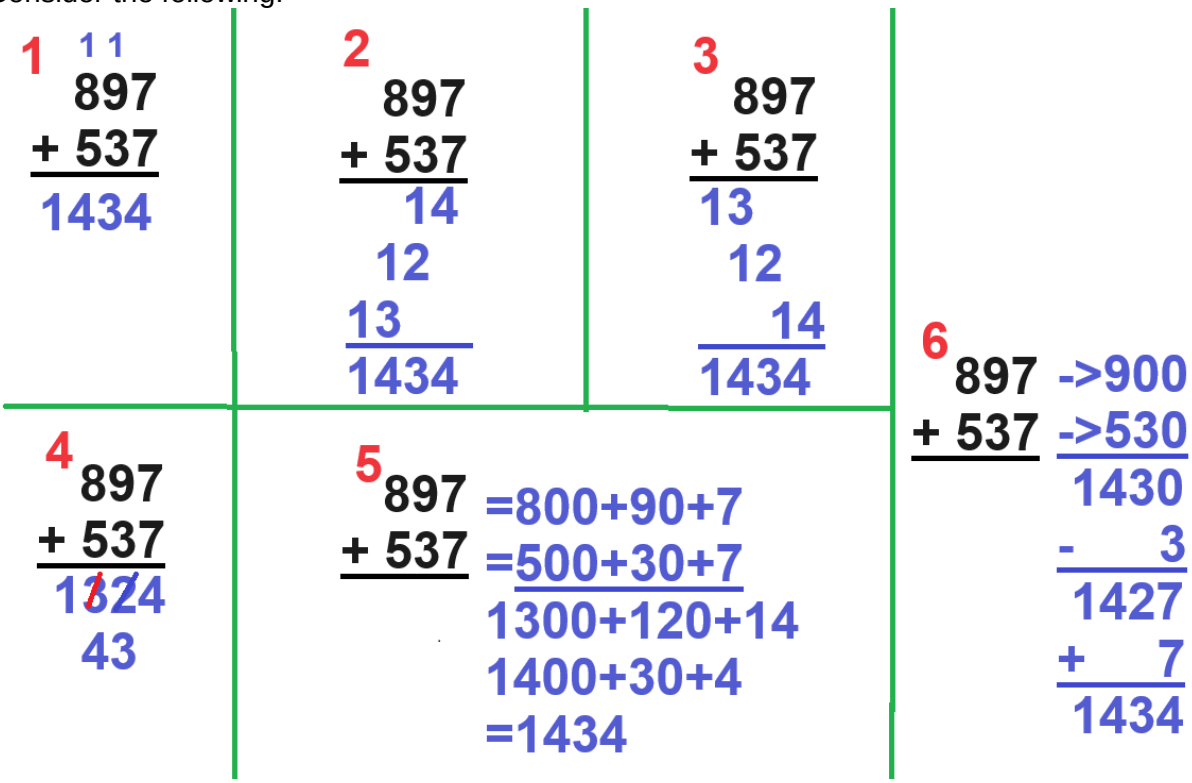

Figure 1:897+537 worked 6 different ways

It's the same problem worked six different ways. They all got the same answer. Is one more right than the others?

Take a minute and try to figure out what's going on for each before you read the rest of the section.

1 Standard Algorithm

This is probably the most familiar. You're adding right to left, and regrouping powers of 10 as you go. This is probably the hardest to explain to someone who has never seen it before, however. It's fairly compact but there's a lot of small parts (why do you carry the 1?)

2 Partial Sums Right to Left

This student is still working right to left, but instead of regrouping, they're recording the full sum for each section. Why are the numbers shifted to the left for the second and third sum?

3 Partial Sums Left to Right

This student had the same idea as number 2, but they worked from left to right. Why do we usually go the other direction? Wouldn't left to right be more natural, since that's how we read?

4 Scratch Method

This student is working left to right. When they add the next column, if they have a 2 digit answer, they scratch out the higher place value and adjust the regrouping.

5 Expanded Form

This student broke each number down into place values, then combined the places. The line above the answer shows where they adjusted for regrouping in the initial step.

6 Compensation

This student rounded the addends to easier numbers, then adjusted the answer by the amount they rounded up and down.

So Which is Right?

All 6 methods are valid. You could have students in your class using any (or all) of them, and I may not have included them all. Our goal is not just to help students get the answer, but to be comfortably thinking mathematically and to understand the underlying concepts. Algorithms can be forgotten—but if you know the concept, you can recreate the algorithm.

At its base, addition is about combining groups. Model 3 + 5 by pushing together a group of 3 and a group of 5. You can extend the idea to larger numbers by combining using base blocks, but it's still just combining groups, and then adjusting for place value.

At its base, subtraction is about taking things away. Model 8-3 by removing 3 things from a group of 8 to see what you have left. The idea extends to larger numbers, too.

We'll discuss modeling in more detail in subsequent sections.

Pieces of an addition problem:

addend + addend = sum

Pieces of a subtraction problem:

minuend – subtrahend = difference