

Understanding Your Child's Mathematics

Addition Strategies, Part 1

Standard Algorithm and Tens & Ones

Project for Elementary Mathematics
James Brickwedde

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The American Standard Algorithm in Addition

Also known as the 'Digit-by-Digit Strategy'

$$\begin{array}{r} 1 \\ 86 \\ + 38 \\ \hline 124 \end{array}$$

The rules we were taught and the *classic language script* we used as we talked our way through the steps said:

- *Start with the ones place. 6 + 8 equals 14. Put down the four. Carry the one. One plus 8 plus 3 equals 12. Write the 12 in front of the 4. The answer is 124.*

This does work. However, if you remember the rules for helping your child (language of place value, limitations, breaking numbers apart, and keeping math visible) this *script*, and I emphasize *the script*, confuses many children and interferes with their place value development. There is nothing *mathematically wrong* with *the strategy*. The problem of confusion comes with the *script!* The place value was ignored. The numbers were treated as a string of single digits. If you placed the numbers in the correct location, you got the correct answer. If not, you are wrong but with no real mathematical understanding about why you were wrong.

Let's change the script and let's make the math visible and see what I mean.

$$\begin{array}{r} 86 \\ + 38 \\ \hline 14 \\ + 110 \\ \hline 124 \end{array}$$

Your New Script:

*6 + 8 is 14; Put down the 14.
80 + 30 is 110; Put down the 110.
110 + 14 is 124. The answer is 124.*

The Math Made Visible:

(This is for you, not necessarily for your child)

$$\begin{array}{r} 86 = 80 + 6 \\ + 38 = 30 + 8 \\ \hline 124 = 110 + 14 \end{array}$$

The difference in the scripts is, in the second version, the value of the numbers and the place value is maintained *at all times*. Placing the numbers whole below the line may take up more space, but it *makes the mathematics visible* for the child while they learn the strategy. It is easier for the child to follow and learn. *Language matters. Talk value, not digits.*

"Mental Math" Strategies: Tens & Ones

Also known as the 'Partial Sums Strategy' or 'Show All Totals'

When out in the grocery store or in a restaurant, and we need to add numbers quickly in our head, we tend to start with the larger parts of the numbers and move to the smaller part next. Children around the world, if left to their own thinking, naturally do the same thing. This makes sense as we read and say the 80 before we read and say the 4 in eighty-four.

Reminder: When I say "mental math" strategy, this isn't to imply that your child can only do this in his or her head. What follows is how this strategy, typically used by adults in their heads, would look like on paper as your child first learns it in the classroom.

Let's take a look at this common strategy.

$$\begin{array}{r} 86 \\ + 38 \\ \hline 110 \\ + 14 \\ \hline 124 \end{array}$$

Your Script:

$80 + 30$ is 110

$6 + 8$ is 14

$110 + 14$ is 124; the answer is 124.

The Math Made Visible:

(This is for you, not necessarily for your child)

$$86 = 80 + 6$$

$$+ 38 = 30 + 8$$

$$124 = 110 + 14$$

Notice something! The Tens & Ones strategy is just the American Standard Algorithm in reverse. The difference is, when adults do this in their heads, place value is maintained at *all times*. The short-cut digit-by-digit language is never used.

Benefits:

1. Your child uses place value language all of the time. Children who think and track the value of the numbers are found to solidify their place value sooner and can work more mentally than children who use the digit-by-digit language/script.

2. This strategy has built in estimation. Strategically, by starting with the larger part of the number you are closer to your answer than when you start with the ones. When adding the numbers above, I know my answer should be at least above 110.

Remember, the numbers can be added and clustered in any order. These are the algebraic ideas called the *commutative and associative properties*. What is important is that your child knows that the numbers can be added in any order and you will always get the same answer.

Stages of Learning:

Your son or daughter may not know what $80 + 30$ is right away. This is how he or she might sound at different stages along the way. All of these are typical of early learners:

- 80 , (pause), 90 , 100 , 110 . They count on.
- $80 + 20$ gets me to 100 plus the other 10 gets me to 110. They break the 30 into 20 and 10 to quickly add the numbers together.
- $8 + 3 = 11$ so $80 + 30 = 110$. They use what they know about smaller numbers to scale up to larger quantities. The important thing to remember is that your child *links the two relations together*. This lays groundwork for an idea in multiplication later on.