

# Sheltonian subtraction

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Michael Martineau [1] has pointed out that there is a lot of room for improvement in the arithmetical algorithms commonly taught in elementary schools. Ideally, an algorithm should be easy to carry out; fast; accurate; and easy to check. It should also be easy to remember and understand.

Here is a new subtraction algorithm, called ‘Sheltonian subtraction’. The algorithm is based on two key ideas. (1) You don’t have to borrow if you aren’t afraid of negative numbers. (2) It is easy to make change if you’re paid with a ten dollar bill. We hope and believe that this algorithm is so good that it requires no explanation. We’ll simply show an example.

Step 1. Subtract.

$$\begin{array}{r} 1\ 2\ 8\ 7\ 4\ 3\ 2\ 0\ 9\ 1\ 3\ 6\ 2\ 7\ 7\ 2\ 6\ 4\ 3 \\ -\quad\quad 3\ 5\ 6\ 3\ 7\ 8\ 2\ 8\ 3\ 2\ 1\ 2\ 8\ 9\ 1\ 7\ 6 \\ \hline 1\ 2\ 5\ 2\ -2\ 0\ -5\ -8\ 7\ -7\ 0\ 4\ 1\ 5\ -1\ -7\ 5\ -3\ -3 \end{array}$$

Step 2. Separate.

$$\begin{array}{r} 1\ 2\ 8\ 7\ 4\ 3\ 2\ 0\ 9\ 1\ 3\ 6\ 2\ 7\ 7\ 2\ 6\ 4\ 3 \\ -\quad\quad 3\ 5\ 6\ 3\ 7\ 8\ 2\ 8\ 3\ 2\ 1\ 2\ 8\ 9\ 1\ 7\ 6 \\ \hline 1\ 2\ 5\ \boxed{2}\ -2\ 0\ -5\ -8\ \boxed{7}\ -7\ \boxed{0}\ 4\ 1\ \boxed{5}\ -1\ -7\ \boxed{5}\ -3\ -3 \end{array}$$

Step 3. Make change.

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1	2	8	7	4	3	2	0	9	1	3	6	2	7	7	2	6	4	3
-		3	5	6	3	7	8	2	8	3	2	1	2	8	9	1	7	6
1	2	5	2	-2	0	-5	-8	7	-7	0	4	1	5	-1	-7	5	-3	-3
1	2	5	1	7	9	4	2	6	3	0	4	1	4	8	3	4	6	7

## Sources

The present work is based on earlier works copyright 2001, 2002 Peter G. Doyle. The subtraction method described here was developed by Peter Doyle to incorporate some of the techniques used by Shelton Cochran for doing mental arithmetic (back when Shelton was in first grade).

## References

- [1] Michael Martineau. True math. preprint.