

**Arithmetics**  
**Addition base 10**  
**[calculator-algebra.org](http://calculator-algebra.org)**

Todor Milev

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## Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = 12$$

$$9 + 7 = 16$$

$$0 + 9 = 9$$

## Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = 10$$

$$9 + 8 = 17$$

$$5 + 5 = 10$$

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

- To do one-digit addition quickly: make table with all possibilities.

## Example

Add the one-digit numbers.

$$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 1 \\ 7 \\ + 6 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 1 \\ 9 \\ + 2 \\ \hline 11 \end{array}$$

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

• Addition can also be written in columns.

## Example

$$\begin{array}{r} 23 \\ + 34 \\ \hline 57 \end{array}$$

## Example

$$\begin{array}{r} \phantom{0}^1 \\ + 67 \\ \phantom{0}8 \\ \hline 75 \end{array}$$

## Example

$$\begin{array}{r} \phantom{0}1\phantom{0}1 \\ + \phantom{0}67 \\ \hline 1029 \end{array}$$

## Example

$$\begin{array}{r} \phantom{+} \phantom{1} \phantom{1} \phantom{1} \\ \phantom{+} \phantom{1} \phantom{1} \phantom{1} \\ + \phantom{1} \phantom{1} \phantom{1} \phantom{1} \\ \phantom{+} \phantom{1} \phantom{1} \phantom{1} \\ \hline 103533 \end{array}$$



We covered addition by example; algorithm follows. Feel free to skip.

### Algorithm (Addition base 10)

1. Set **maxNumberOfDigits** to the larger number of digits.
2. For each digit position **i**, starting at position **0**:
  - 2.1. - Let **topDigit** and **bottomDigit** be the two digits in **i<sup>th</sup>** position. If smaller number has no digit at the position, set its digit to **0**.
  - 2.2. - Set **digitSum** to **topDigit + bottomDigit**.
  - 2.3. - If **digitSum**  $\geq 10$ , set **resultDigit** = **digitSum** - 10 and **carryOver** = 1.  
- Else **digitSum**  $< 10$ , so set **resultDigit** = **digitSum** and **carryOver** = 0.
  - 2.4. - Set the result's **i<sup>th</sup>** digit to **resultDigit**.
3. If after last step **carryOver** is **1**, set **1** as the result's (**maxNumberOfDigits** + 1)<sup>th</sup> digit.