

Cryptography 101
One digit addition base 10
calculator-algebra.org

Todor Milev

2018

Example

Add the one-digit numbers.

$$1 + 2 =$$

$$2 + 2 =$$

$$2 + 5 =$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = ?$$

$$2 + 2 =$$

$$2 + 5 =$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 =$$

$$2 + 5 =$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = ?$$

$$2 + 5 =$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 =$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = ?$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 =$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = ?$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 =$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = ?$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = 12$$

$$9 + 7 =$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = 12$$

$$9 + 7 = ?$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = 12$$

$$9 + 7 = 16$$

$$0 + 9 =$$

Example

Add the one-digit numbers.

$$1 + 2 = 3$$

$$2 + 2 = 4$$

$$2 + 5 = 7$$

$$9 + 2 = 11$$

$$7 + 5 = 12$$

$$9 + 7 = 16$$

$$0 + 9 = ?$$

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.

$$1 + 3 =$$

$$4 + 7 =$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

Example

Add the one-digit numbers.

$$1 + 3 =$$

$$4 + 7 =$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

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

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

Example

Add the one-digit numbers.

$$1 + 3 = ?$$

$$4 + 7 =$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				?						
2										
3										
4										
5										
6										
7										
8										
9										

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 =$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

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

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = ?$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2										
3										
4								?		
5										
6										
7										
8										
9										

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 =$$

$$9 + 8 =$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2										
3										
4								11		
5										
6										
7										
8										
9										

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = ?$$

$$9 + 8 =$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2									?	
3										
4								11		
5										
6										
7										
8										
9										

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = 10$$

$$9 + 8 =$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2									10	
3										
4								11		
5										
6										
7										
8										
9										

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = 10$$

$$9 + 8 = ?$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2									10	
3										
4								11		
5										
6										
7										
8										
9									?	

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = 10$$

$$9 + 8 = 17$$

$$5 + 5 =$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2									10	
3										
4								11		
5										
6										
7										
8										
9									17	

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

Example

Add the one-digit numbers.

$$1 + 3 = 4$$

$$4 + 7 = 11$$

$$2 + 8 = 10$$

$$9 + 8 = 17$$

$$5 + 5 = ?$$

+	0	1	2	3	4	5	6	7	8	9
0										
1				4						
2									10	
3										
4								11		
5						?				
6										
7										
8										
9									17	

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

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										
1				4						
2									10	
3										
4								11		
5						10				
6										
7										
8										
9									17	

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

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	?	?	?	?	?	?	?	?	?	?
1	?	?	?	4	?	?	?	?	?	?
2	?	?	?	?	?	?	?	?	10	?
3	?	?	?	?	?	?	?	?	?	?
4	?	?	?	?	?	?	?	11	?	?
5	?	?	?	?	?	10	?	?	?	?
6	?	?	?	?	?	?	?	?	?	?
7	?	?	?	?	?	?	?	?	?	?
8	?	?	?	?	?	?	?	?	?	?
9	?	?	?	?	?	?	?	?	17	?

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

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.

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

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

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

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

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$3 + 5 = ?$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						?				
4										
5										
6										
7										
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$3 + 5 = 8$$

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

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$3 + 5 = 8$$

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

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

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

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

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

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$7 + 6 = ?$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3					8					
4										
5										
6										
7							?			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

$$\begin{array}{r} & 1 \\ + & 7 \\ & 6 \\ \hline & 3 \end{array}$$

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

$$7 + 6 = 13$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

$$\begin{array}{r} \\ + 7 \\ 6 \\ \hline 3 \end{array}$$

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

$$7 + 6 = 13$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

$$\begin{array}{r} \overset{1}{+ 7} \\ 6 \\ \hline 3 \end{array}$$

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

$$7 + 6 = 13$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

$$\begin{array}{r} \textcolor{red}{1} \\ + 7 \\ + 6 \\ \hline \textcolor{red}{1}3 \end{array}$$

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

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9										

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$9 + 2 = ?$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			?							

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$9 + 2 = 11$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			11							

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$9 + 2 = 11$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			11							

- Addition can also be written in columns.

Example

Add the one-digit numbers.

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

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

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

$$9 + 2 = 11$$

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			11							

- Addition can also be written in columns.

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										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			11							

- Addition can also be written in columns.

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										
1										
2										
3						8				
4										
5										
6										
7							13			
8										
9			11							

- Addition can also be written in columns.

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	?	?	?	?	?	?	?	?	?	?
1	?	?	?	?	?	?	?	?	?	?
2	?	?	?	?	?	?	?	?	?	?
3	?	?	?	?	?	8	?	?	?	?
4	?	?	?	?	?	?	?	?	?	?
5	?	?	?	?	?	?	?	?	?	?
6	?	?	?	?	?	?	?	?	?	?
7	?	?	?	?	?	?	13	?	?	?
8	?	?	?	?	?	?	?	?	?	?
9	?	?	11	?	?	?	?	?	?	?

- Addition can also be written in columns.

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.