

How to add in Hexadecimal without a Calculator or Decimal conversions with a Pencil and Paper.

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The problem this solves is:

If you have to add some hexadecimal numbers and you don't have a calculator and you want to avoid converting to decimal, but you aren't that good in hex yet. Or maybe you are real brain dead but you need to do some adding. THIS IS ALL TO BE DONE ON PAPER WITH A PENCIL. I think the method of notation is clean enough that you will not easily make a mistake. Or maybe you have a teacher that is making you had in hex for a test?

Here is my solution:

Make the table below; it is very easy to construct.

You can use this table to do the adding of two hex digits at a time.

If for example you need to add B + 8, you just index B:8 in the table.

Which gives you 3. NOTE: Because you land on the right side of the MAGICAL DIAGONAL LINE OF ZEROS you have to carry a 1.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 |
| 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 |
| 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 |
| 6 | 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 |
| 7 | 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 8 | 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9 | A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| A | B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| B | C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A |
| C | D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B |
| D | E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
| E | F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D |
| F | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E |

Some example numbers to add will be A4B7 82C0 + F231 9BD7 + 3BD0 26CA ...

This is how I do my notation for the addition:

First I set up my digits so that there is a space between each.

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  4 B 7 8 2 C 0 B
  F 2 3 1 9 B D 7
+3 B D 0 2 6 C A

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The area in yellow is where I put my carry digits.

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 0 \text{ B} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D } 7 \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A} \\
 \hline
 \end{array}$$

The first carry digit is zero, so just write it in (mostly for consistency).

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 0 \text{ B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D } 7 \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A} \\
 \hline
 \end{array}$$

Add $\text{B} + 0$, the answer is B of course (also mostly for consistency).

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 0 \text{ B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D } 7\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A} \\
 \hline
 \end{array}$$

Next add $7 + \text{B}$; from the table we can see the answer is 2 (carry 1).

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 01\text{B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D } 7\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A}2 \\
 \hline
 \end{array}$$

Then add $\text{A} + 2$, which is C .

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 01\text{B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D } 7\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A}2 \\
 \hline
 \text{C}
 \end{array}$$

Then add $0 + 1$, which is 1 .

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 01\text{B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D}17\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C } \text{ A}2 \\
 \hline
 \text{C}
 \end{array}$$

Then add $\text{D} + 1$, which is E .

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C } 01\text{B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D}17\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C} \text{ E} \text{ A}2 \\
 \hline
 \text{C}
 \end{array}$$

Then add $\text{A} + 2$, which is C .

$$\begin{array}{r}
 4 \text{ B } 7 \text{ 8 } 2 \text{ C}101\text{B0} \\
 \text{F } 2 \text{ 3 } 1 \text{ 9 } \text{ B } \text{ D}17\text{B} \\
 +3 \text{ B } \text{ D } 0 \text{ 2 } 6 \text{ C} \text{ E} \text{ A}2 \\
 \hline
 \text{A } \text{ C}
 \end{array}$$

And so on until you are done.