

3.2 Notes

3.2: Algorithms for Addition and Subtraction

Example: (The Standard Algorithm) Add 1047 and 256.

Note: Nowadays, we use the word "trade" or "regroup" instead of "carry".

Standard Algorithm:

$$\begin{array}{r} 1047 \\ + 256 \\ \hline 1303 \end{array}$$

Example: (The Left to Right Algorithm)

$$\begin{array}{r} 1047 \\ + 256 \\ \hline \end{array}$$

$$\begin{array}{r} 2359 \\ + 5667 \\ \hline \end{array}$$

Why does this work?

Example: (The Lattice Algorithm)

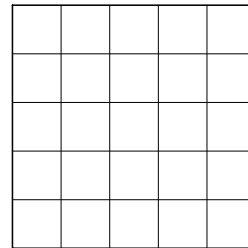
$$\begin{array}{r} 1 \quad 0 \quad 4 \quad 7 \\ + \quad 2 \quad 5 \quad 6 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \quad 7 \quad 9 \quad 4 \\ + 3 \quad 2 \quad 9 \quad 7 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \quad 3 \quad 5 \quad 9 \\ + 5 \quad 6 \quad 6 \quad 7 \\ \hline \end{array}$$

Why does this work?

Base 5 Addition: We can use all of the previous algorithms with base 5 numbers using this table.



Example: Add 343_{five} and 2121_{five} .

Example: All numbers are base 5.

Standard:

$$\begin{array}{r} 343 \\ + 2121 \\ \hline \end{array}$$

$$\begin{array}{r} 2103 \\ + 2244 \\ \hline \end{array}$$

Left to Right:

$$\begin{array}{r} 343 \\ + 2121 \\ \hline \end{array}$$

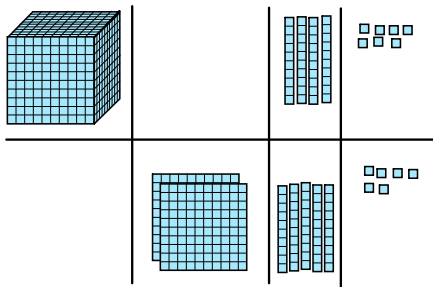
Lattice:

$$\begin{array}{r} \quad \quad 3 \quad 4 \quad 3 \\ + 2 \quad 1 \quad 2 \quad 1 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \quad 1 \quad 0 \quad 3 \\ + 2 \quad 2 \quad 4 \quad 4 \\ \hline \end{array}$$

3.2 Notes

Example: (The Standard Algorithm) $1047 - 256$.



Standard
Algorithm:

$$\begin{array}{r} 1047 \\ - 256 \\ \hline \end{array}$$

Example: (Equal Additions Algorithm)

$$\begin{array}{r} 1047 \\ - 256 \\ \hline \end{array}$$

$$\begin{array}{r} 2359 \\ - 467 \\ \hline \end{array}$$

$$\begin{array}{r} 5238 \\ - 478 \\ \hline \end{array}$$

Why does this work?

Example: All numbers are base 5.

Standard:

$$\begin{array}{r} 1132 \\ - 434 \\ \hline \end{array}$$

$$\begin{array}{r} 4302 \\ - 3423 \\ \hline \end{array}$$

Equal Additions:

$$\begin{array}{r} 1132 \\ - 434 \\ \hline \end{array}$$

$$\begin{array}{r} 4302 \\ - 3423 \\ \hline \end{array}$$

Standard:

$$\begin{array}{r} 1012 \\ - 13 \\ \hline \end{array}$$

$$\begin{array}{r} 3001 \\ - 1323 \\ \hline \end{array}$$

Equal Additions:

$$\begin{array}{r} 1012 \\ - 13 \\ \hline \end{array}$$

$$\begin{array}{r} 3001 \\ - 1323 \\ \hline \end{array}$$