3.4 Notes

3.4: Algorithms for Multiplication and Division

Example: (The Standard Algorithm - Single Digit)

Multiply 3037 and 4.

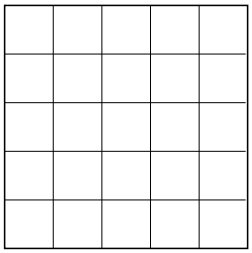
$$\begin{array}{r} 3\ 0\ 3\ 7 \\ 3\ 0\ 3\ 7 \\ 3\ 0\ 3\ 7 \\ +\ 3\ 0\ 3\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 3\ 0\ 3\ 7 \\ \times \qquad 4 \\ \hline \end{array}$$

Example: (Lattice Multiplication)

(a) Multiply 23 and 14.

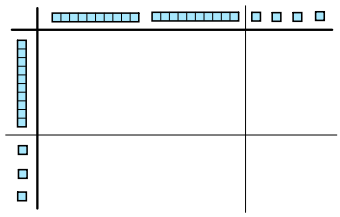
Why does this work?

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



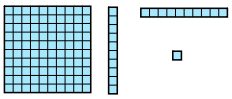
Example: (The Standard Algorithm - Multiple Digit)

Multiply 24 and 13.



Standard Algorithm:

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

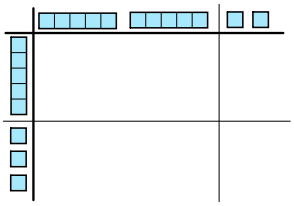


Example: (Lattice Multiplication)

(b) Multiply 75 and 20.

(c) Multiply 273 and 54.

Example: Multiply 14_{five} and 22_{five}.



Standard Algorithm:

$$\begin{array}{r} 1\ 4 \\ \times\ 2\ 2 \\ \hline \end{array}$$

3.4 Notes

Example: All numbers are base 5.

Standard:

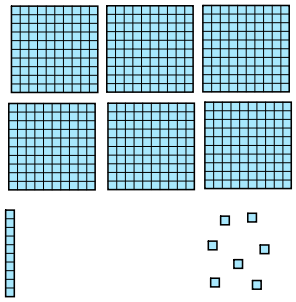
$$\begin{array}{r} 1\ 4 \\ \times\ 2\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 3\ 3 \\ \times\ 3\ 2 \\ \hline \end{array}$$

Lattice:

The Long Division Algorithm:

Example: Calculate $617 \div 5$



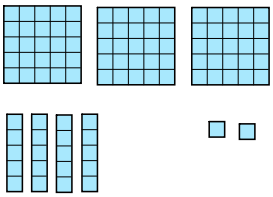
$$5\overline{)6\ 1\ 7}$$

Example: Carefully explain why this works:

$$23\overline{)1\ 9\ 8\ 6}$$

Example: Calculate $342_{five} \div 2_{five}$.

Let's try $342_{five} \div 2_{five}$ with Base 5 blocks.



Example: Calculate $213_{five} \div 3_{five}$.

3.4 Notes

Example: Calculate $1322_{five} \div 32_{five}$.

Example: Calculate $2002_{five} \div 21_{five}$.