3.2 Completed Notes

1. Nick and his friends ate 285 M&Ms from a bowl containing 546 M&Ms. How many more M&Ms do they need to eat in order to eat them all?

Missing addends – how much more to reach the goal?

2. Latoya goes on a two hour shopping spree and spends $1500 in two hours. If she spent $685 in the second hour, how much did she spend during the first hour?

Number Line Sub. – Given 2nd piece of information and want first.

3. Jenna's cookie jar had 16 cookies in it. She baked 24 more cookies. When they cooled, she added them to the cookie jar. What is the new total number of cookies in Jenna's cookie jar?

Number line – add. added more cookies to the jar

4. James bought a new camera. He took pictures of birds and squirrels at the park. He took 63 pictures of birds and 24 pictures of squirrels. How many pictures did he take in all?

Set Model – two different sets

5. Bob has 1,297 football cards. Sammy has 1,488. How many more cards does Sammy have than Bob?

Comparison - comparing two sets

6. Justin read 51 pages of his book on Monday. On Tuesday, he read 38 more pages. How many pages did he read on both days combined?

Number - added on more pages
Line Add.

7. A cashier at a grocery store tells her customer that his total is $25.89. The customer gives the cashier $4.00 in cash and has to pay the rest on a debit card. How much money does the customer pay on his debit card?

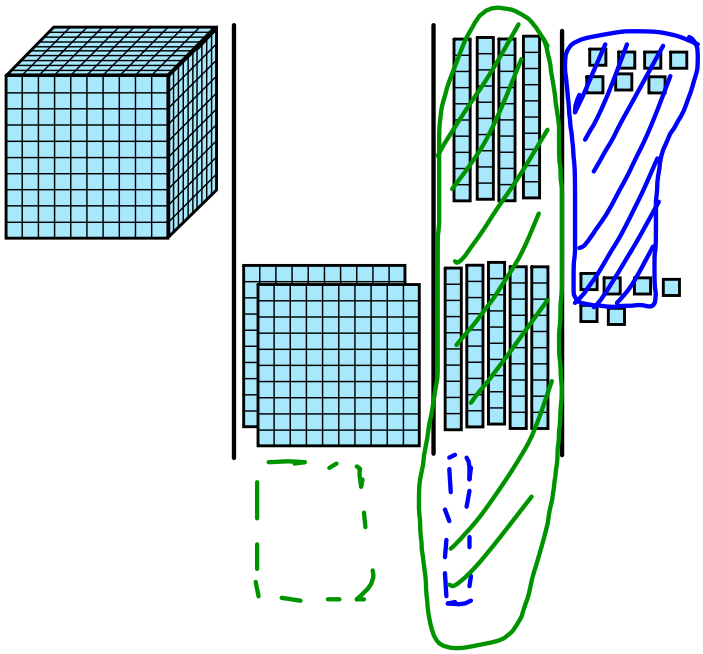
Take-away - Took $4 off the bill.

8. Karen and Josh were picking strawberries. Karen picked 226 strawberries. Josh picked 193 strawberries. How many strawberries did they pick altogether?

Set Model - Karen and Josh are two different sets

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:

$$\begin{array}{r} {\scriptstyle 11} \\ 1047 \\ +\ 256 \\ \hline 1303 \end{array}$$

Example: (The Left to Right Algorithm)

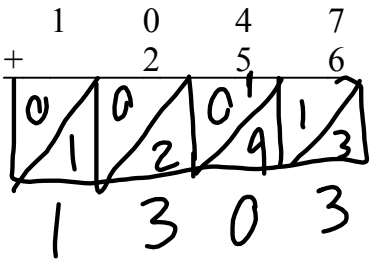
$$\begin{array}{r} 1047 \\ +\ 256 \\ \hline 1000 \\ 200 \\ 90 \\ +\ 13 \\ \hline 1000 \\ 200 \\ 100 \\ +\ 3 \\ \hline 1303 \end{array}$$

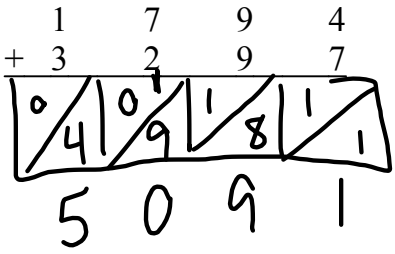
$$\begin{array}{r} 2359 \\ +\ 5667 \\ \hline 7000 \\ 900 \\ 110 \\ +\ 16 \\ \hline 7000 \\ 1000 \\ 20 \\ +\ 6 \\ \hline 8026 \end{array}$$

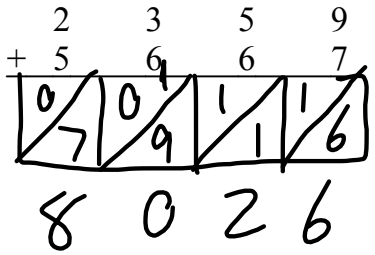
Why does this work?

Automatically regroups into a new column.

Example: (The Lattice Algorithm)







Why does this work?

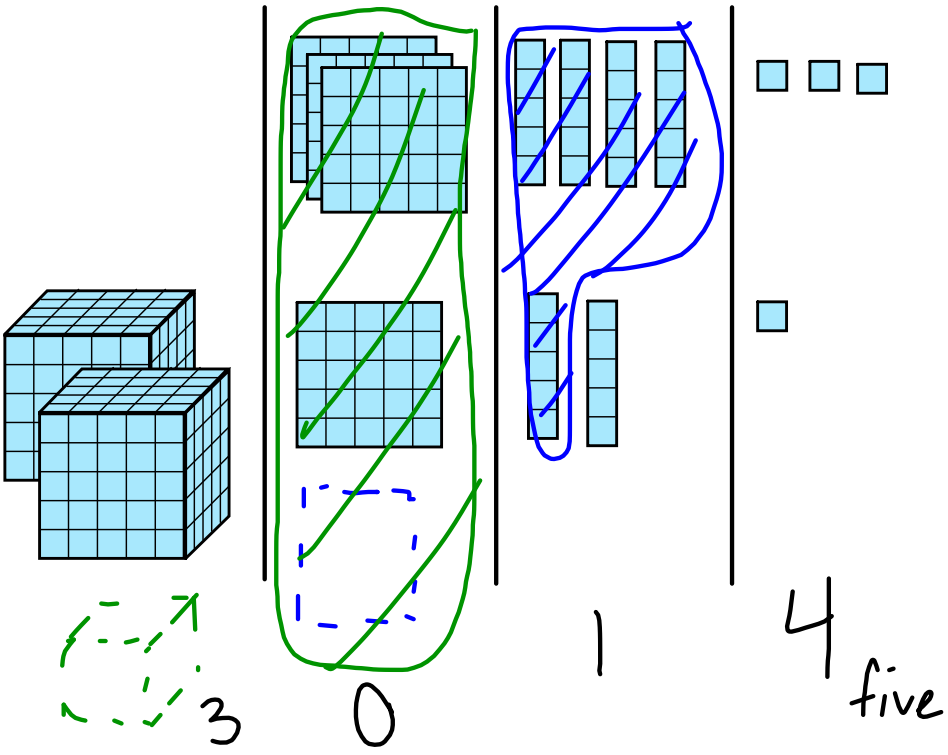
When regrouping required, it is put in the next place value's diagonal.

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

	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	10
2	2	3	4	10	11
3	3	4	10	11	12
4	4	10	11	12	13

3.2 Completed Notes

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



Example: All numbers are base 5.

Standard:

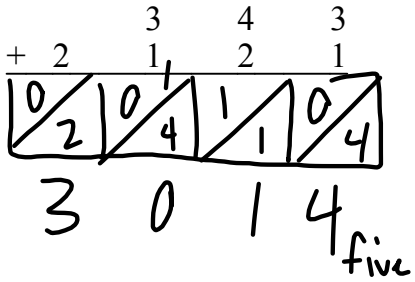
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 343 \\ +\,2121 \\ \hline 3014_{five} \end{array}$$

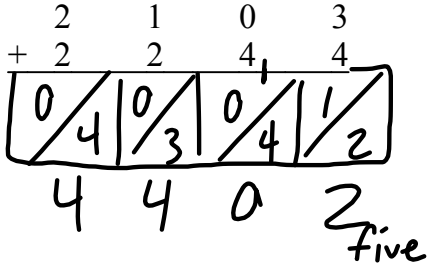
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 2103 \\ +\,2244 \\ \hline 4402_{five} \end{array}$$

Left to Right:

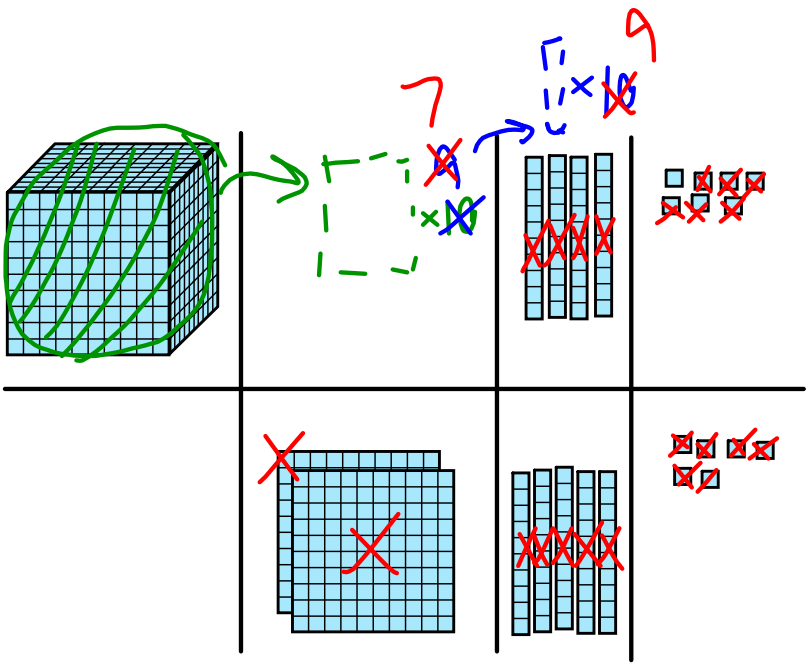
$$\begin{array}{r} 343 \\ +\,2121 \\ \hline 2000 \\ 400 \\ 110 \\ +\quad 4 \\ \hline 2000 \\ 1000 \\ 10 \\ +\quad 4 \\ \hline 3014_{five} \end{array}$$

Lattice:





Example: (The Standard Algorithm) 1047 - 256.



Standard Algorithm:

$$\begin{array}{r} {}^{0}\cancel{1}\,{}^{9}\cancel{0}\,{}^{14}\cancel{4}\,7 \\ -\ 2\ 5\ 6 \\ \hline 7\ 9\ 1 \end{array}$$

Example: (Equal Additions Algorithm)

$$\begin{array}{r} 1047 \xrightarrow{+50} 1097 \xrightarrow{+700} 1797 \\ -\ 256 \xrightarrow{+50} -\ 306 \xrightarrow{+700} -1006 \\ \hline 791 \end{array}$$

$$\begin{array}{r} 2359 \xrightarrow{+40} 2399 \xrightarrow{+500} 2899 \\ -\ 467 \xrightarrow{+40} -\ 507 \xrightarrow{+500} -1007 \\ \hline 1892 \end{array}$$

$$\begin{array}{r} 5238 \xrightarrow{+30} 5268 \xrightarrow{+500} 5768 \\ -\ 478 \xrightarrow{+30} -\ 508 \xrightarrow{+500} -1008 \\ \hline 4760 \end{array}$$

Why does this work?

$(1047+50)-(256+50)$ You add and subtract the same value.

$=1047+\cancel{50}-256-\cancel{50}$

3.2 Completed Notes

Example: All numbers are base 5.

Standard:

$$\begin{array}{r} 0\ 10\ 12\ 12 \\ -\quad 4\ 3\ 4 \\ \hline 1\ 4\ 3 \end{array}_{five}$$

Equal Additions:

$$\begin{array}{r} 1132 \\ -\ 434 \\ \hline \end{array} \xrightarrow{+1} \begin{array}{r} 1133 \\ -440 \\ \hline \end{array} \xrightarrow{+10} \begin{array}{r} 1143 \\ -1000 \\ \hline 143_{five} \end{array}$$

$$\begin{array}{r} 434 \\ +\ 1 \\ \hline 440 \end{array} \qquad \begin{array}{r} 1 \\ 440 \\ +\ 10 \\ \hline 1000 \end{array}$$

Standard:

$$\begin{array}{r} 12\ 4 \\ 3\ 2\ 10\ 12 \\ -\ 3\ 4\ 2\ 3 \\ \hline 3\ 2\ 4 \end{array}_{five}$$

Equal Additions:

$$\begin{array}{r} 4302 \\ -3423 \\ \hline \end{array} \xrightarrow{+2} \begin{array}{r} 4304 \\ -3430 \\ \hline \end{array} \xrightarrow{+20} \begin{array}{r} 4324 \\ -4000 \\ \hline 324_{five} \end{array}$$

$$\begin{array}{r} 3423 \\ +\ 2 \\ \hline 3430 \end{array} \qquad \begin{array}{r} 1 \\ 3430 \\ +\ 20 \\ \hline 4000 \end{array}$$

Example: All numbers are base 5.

Standard:

$$\begin{array}{r} 4\ 10 \\ 0\ 10\ 10\ 12 \\ -\quad 1\ 3 \\ \hline 4\ 4\ 4 \end{array}_{five}$$

Equal Additions:

$$\begin{array}{r} 1012 \\ -\ 13 \\ \hline \end{array} \xrightarrow{+2} \begin{array}{r} 1014 \\ -\ 20 \\ \hline \end{array} \xrightarrow{+30} \begin{array}{r} 1044 \\ -100 \\ \hline \end{array} \xrightarrow{+400} \begin{array}{r} 1444 \\ -1000 \\ \hline 444_{five} \end{array}$$

$$\begin{array}{r} 20 \\ +30 \\ \hline 100 \end{array}$$

Standard:

$$\begin{array}{r} 4\ 4 \\ 2\ 10\ 10\ 11 \\ -\ 1\ 3\ 2\ 3 \\ \hline 1\ 1\ 2\ 3 \end{array}_{five}$$

Equal Additions:

$$\begin{array}{r} 3001 \\ -1323 \\ \hline \end{array} \xrightarrow{+2} \begin{array}{r} 3003 \\ -1330 \\ \hline \end{array} \xrightarrow{+20} \begin{array}{r} 3023 \\ -1400 \\ \hline \end{array} \xrightarrow{+100} \begin{array}{r} 3123 \\ -2000 \\ \hline 1123_{five} \end{array}$$