Abstract

Compact columnar method for addition.

Addition tips…

Before you do an addition, especially with large numbers,

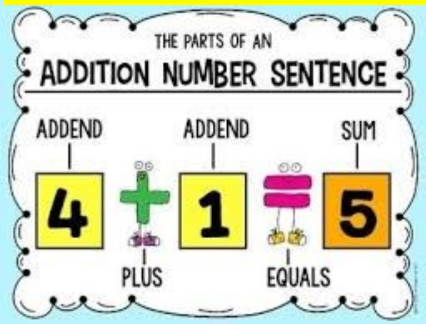
ESTIMATE!

2,156 rounds down to 2,000

1,473 rounds up to 1,500

2,000 + 1,500 = 3,500

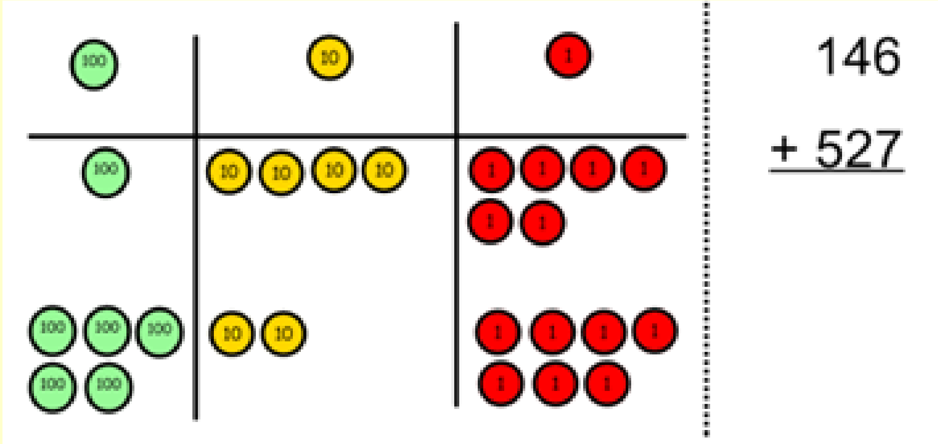
The answer to 2,156 + 1,473 is around 3,500.



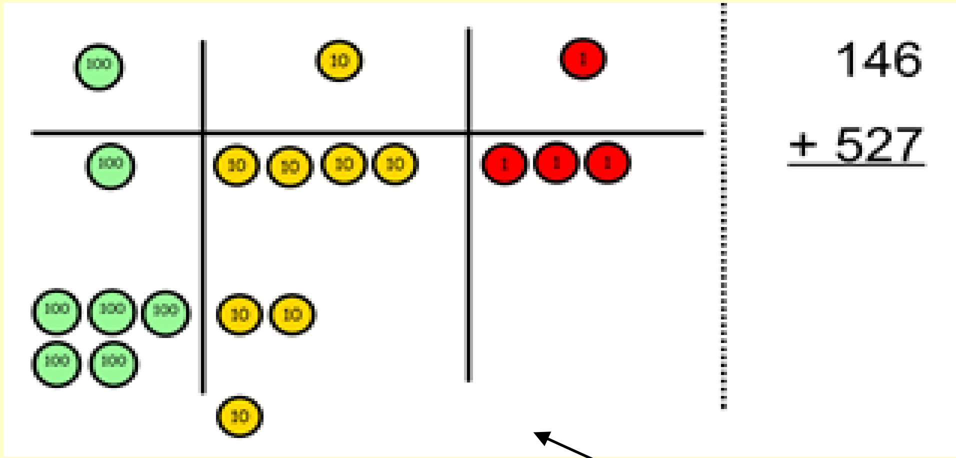
Step 1. **Question**	**2,156 + 1,473 =** **Set out your calculation.**	2 1 5 6 + 1 4 7 3 ______
Step 2.	**First add the ones.** **6 + 3 = 9**	2 1 5 6 + 1 4 7 3 9
Step 3.	**Then add the tens.** **5 + 7 = 12** This is really 5 tens add 7 tens or 50 + 70 = 120	2 1 5 6 + 1 4 7 3 2 9 1 As the answer (12) is larger than 9 the 10 carries into the hundreds column.
Step 4.	**Next add the hundreds.** **1 + 4 + 1 = 6** **Don't forget to add the carried 10.**	2 1 5 6 + 1 4 7 3 6 2 9 1
Step 5.	**Finally add the thousands.** **2 + 1 = 3** Remember, this is really 2 thousands add 1 thousand or 2 , 000 + 1 , 000 = 3 , 000	2 1 5 6 + 1 4 7 3 3 6 2 9 1
Step 6. **Answer**	**2,156 + 1,473 = 3,629** **You can check this by doing the inverse.**	3 5 ~~6~~ 1 2 9 - 1 4 7 3 2 1 5 6

Concrete and Pictorial methods to solve addition calculations.

Show both numbers on a place value grid using counters or by drawing it.



Add the ones and exchange 10 ones for one 10.



600 + 70 + 3 = 673

Add the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

Abstract

Compact columnar method for subtraction.

SUBTRACTION

take away	take from
minus	fewer
less	take
reduce	difference
remain	how many more

Subtraction tips…

Before you do a subtraction, especially with large numbers,

ESTIMATE!

2,371 rounds up to 2,500

1,424 rounds up to 1,500

2,500 - 1,500 = 1,000

The answer to 2,371 - 1,424 is around 1,000.

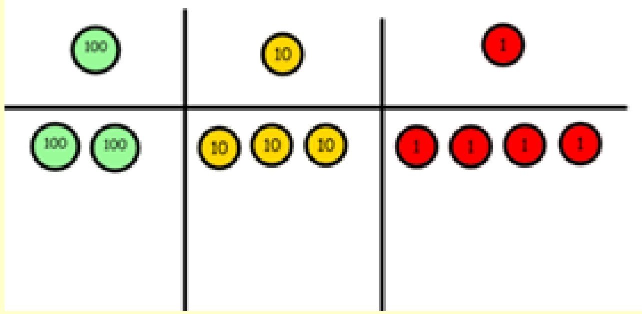
6 - 1 = 5

Minuend Subtrahend Difference

Step 1. Question	2,371 - 1,424 = Set out your calculation.	2 3 7 1 - 1 4 2 4
Step 2.	First subtract the ones. 1 - 4 won't work so exchange 1 ten into the ones column **so** 11 - 4 = 7	$2\ 3\ {}^{6}\cancel{7}\ {}^{1}1$ - 1 4 2 4
Step 3.	Then subtract the tens. 6 - 2 = 4 This is really 6 tens subtract 2 tens or 60 - 20 = 40	$2\ 3\ {}^{6}\cancel{7}\ {}^{1}1$ - 1 4 2 4
Step 4.	Next subtract the hundreds. 3 - 4 won't work so exchange 1 thousand into the hundreds column **so** 13 - 4 = 9	${}^{1}\cancel{2}\ {}^{1}3\ {}^{6}\cancel{7}\ {}^{1}1$ - 1 4 2 4
Step 5.	Finally subtract the thousands. 1 - 1 = 0 Remember, this is really 2 thousands add 1 thousand or 1 , 000 - 1 , 000 = 0	${}^{1}\cancel{2}\ {}^{1}3\ {}^{6}\cancel{7}\ {}^{1}1$ - 1 4 2 4
Step 6. Answer	2,371 - 1,424 = 947 You can check this by doing the inverse.	1 4 2 4 + 9 4 7 2 3 7 1 1 1

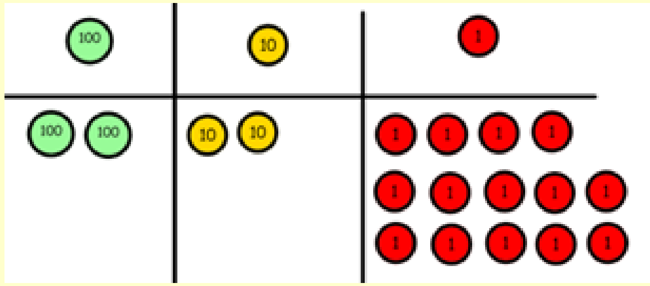
Concrete and pictorial methods to solve subtraction calculations.

1. Make (draw) the larger number (minuend) with the place value counters.



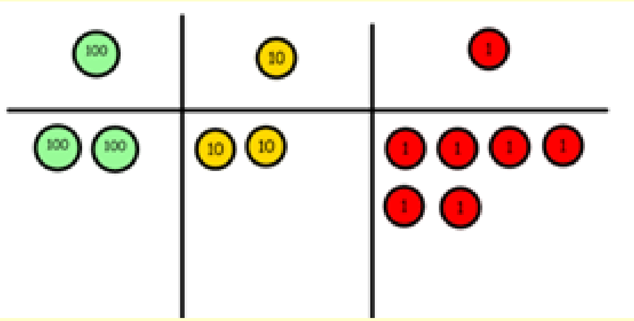
$$\begin{array}{r} 2\ 3\ 4 \\ -\ 1\ 8\ 8 \\ \hline \\ \hline \end{array}$$

2. Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.

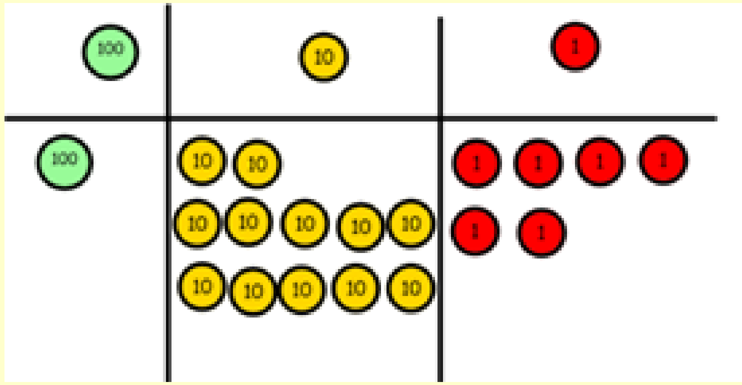


$$\begin{array}{r} 2\ \ \ \\ 2\ \cancel{3}\ {}^{1}4 \\ -\ 1\ 8\ 8 \\ \hline \\ \hline \end{array}$$

Now I can subtract my ones.

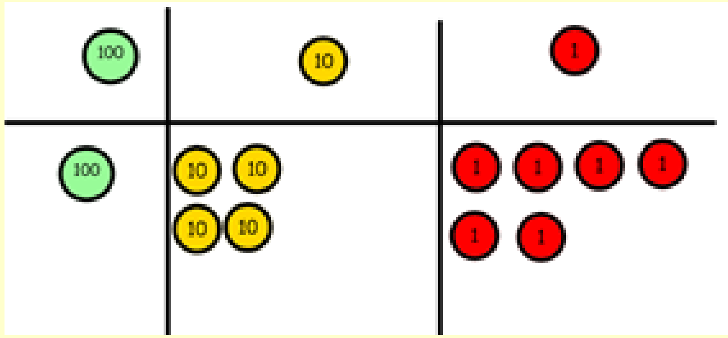


3. Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.



$$\begin{array}{r} 2\ \ \ \\ 2\ \cancel{3}\ {}^{1}4 \\ -\ 1\ 8\ 8 \\ \hline 6 \\ \hline \end{array}$$

Now I can take away eight tens and complete my subtraction.



$$\begin{array}{r} {}^{1}\ \ 12\ \ \ \\ \cancel{2}\ \cancel{3}\ {}^{1}4 \\ -\ 1\ 8\ 8 \\ \hline 0\ 4\ 6 \\ \hline \end{array}$$

This works alongside the abstract method for subtraction.

0 + 40 + 6 = 46   **<u>so</u>**   **234 - 188 = 46**

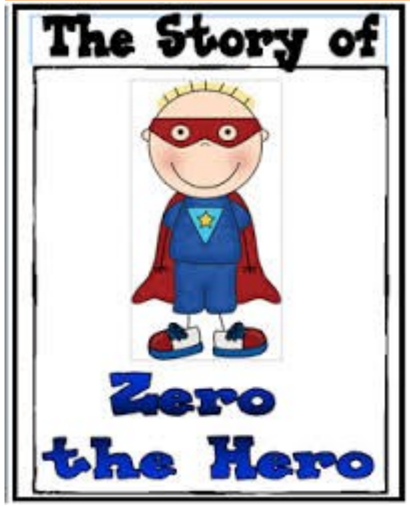
Abstract

Multiplication (2 digit x 2 digit).

```
    2 3
  x 1 5
  -----
  1 1 5
    1
+ 2 3 0
  -----
  3 4 5
```

Zero the Hero!

Red : 5x3
Orange : 5x2
Yellow : 1x3
Green : 1x2



By using 'Zero the Hero' you simplify the calculation so you can multiply by a one digit number at each stage in a multiplication calculation.

When you multiply by 10, 'Zero the Hero' pushes the numbers 1 place to the left

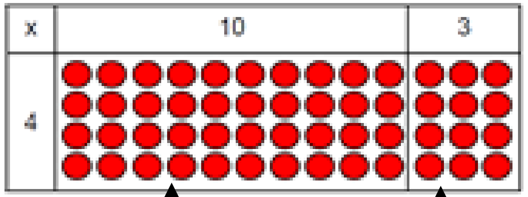
23 x 15 = 345

Factor Factor Product

Step 1. (Red)	Beginning in the bottom right hand side of the column, multiply the ones (units). 5 x 3 = 15
Step 2. (Orange)	Staying in the bottom right hand side of the column, multiply the ones by the tens (on the top row). 5 x 2 = 10
Step 3. 	Zero the Hero!
Step 4. (Yellow)	Moving to the bottom left hand side of the column, multiply the tens by the ones (on the top row). 1 x 3 = 3
Step 5. (Green)	Staying in the bottom left hand side of the column, multiply the tens by the tens (on the top row). 1 x 2 = 2
Step 6. (Addition)	Add the two products to find the answer to the calculation.

Pictorial methods to solve multiplication calculations.

Link arrays with the grid method.



4 rows of 10
4 rows of 3

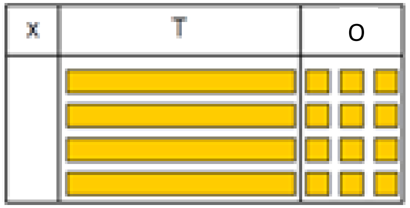
$$\begin{array}{r} 4\ 0 \\ +\ 1\ 2 \\ \hline 5\ 2 \\ \hline \end{array}$$

4 x 10 = 40

3 x 4 = 12

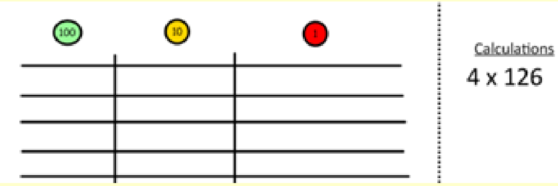
Concrete methods to solve multiplication calculations.

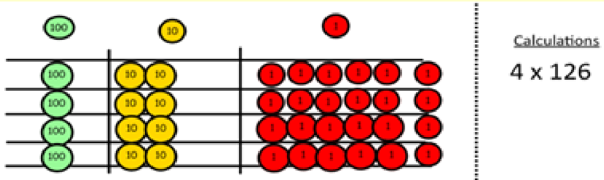
Move on to using Base 10 to move towards a more compact method.



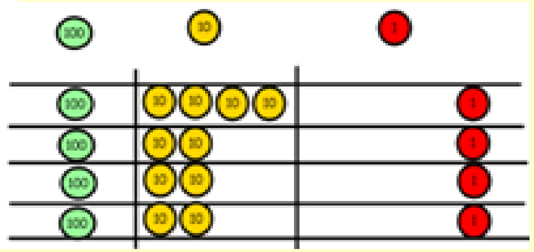
4 rows of 13

1. Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.

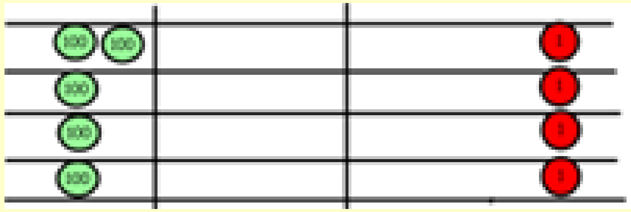




2. Fill each row with 126.



3. Add up each column, starting with the ones making any exchanges needed.



4. Then you have your answer.

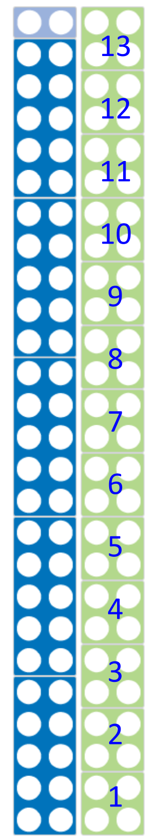
Using Numicon

13 x 4 = 52

Put 13 4s in a train.

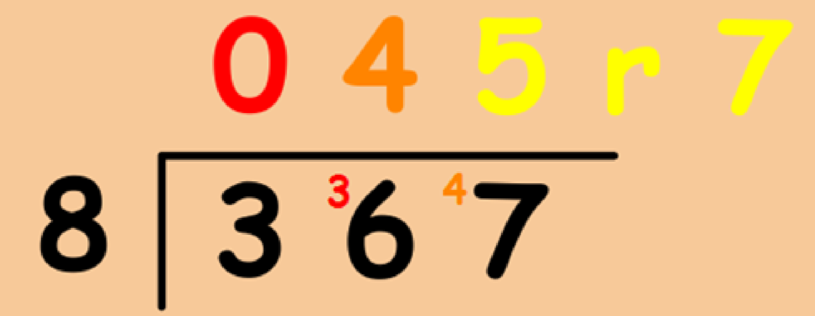
Then put tens alongside

to count the total quickly.

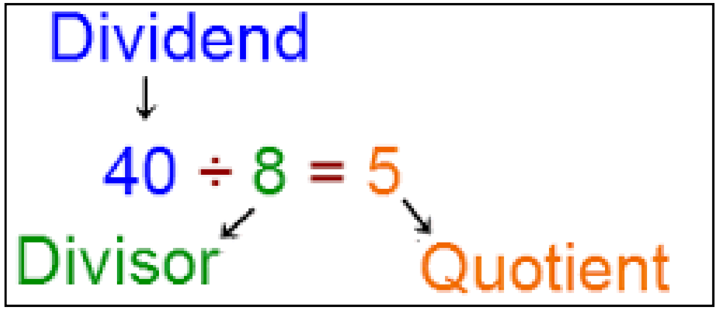


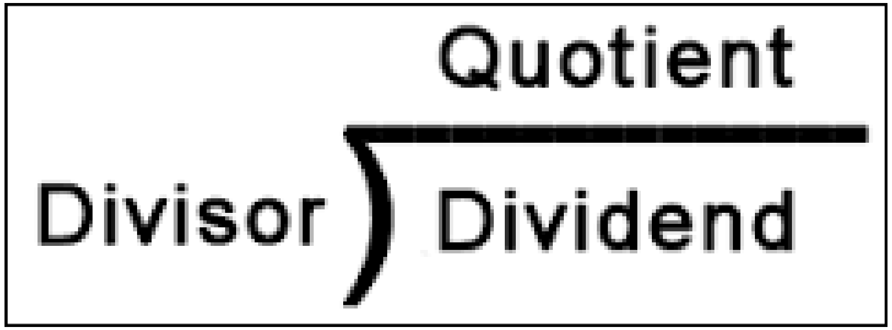
Abstract

Division (Bus Stop Method).



STEP 1 - How many 8's in 3? Answer 0
STEP 2 - How many 8's in 36? Answer 4 remainder 4
STEP 3 - How many 8's in 47? Answer 5 remainder 7





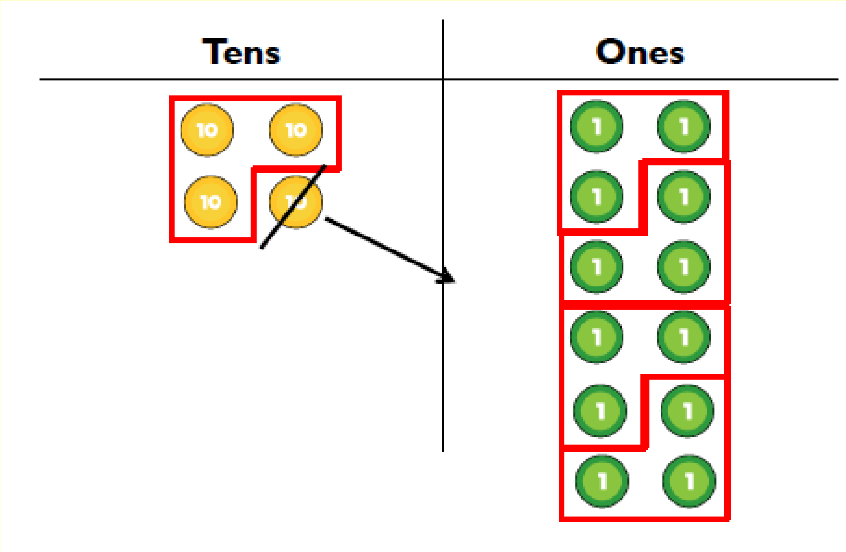
367 ÷ 8 = 45 r 7

Dividend Divisor Quotient Remainder

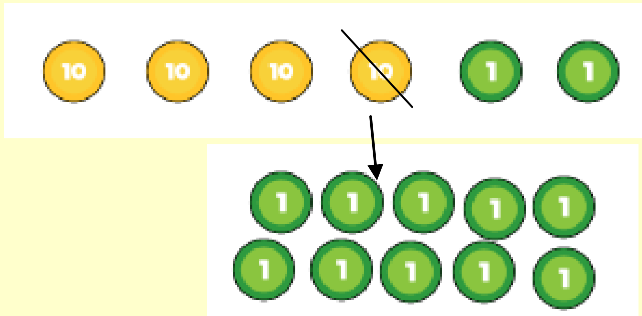
Question:	367 ÷ 8 =
Step 1. (Red)	Find 3 divided by 8. The answer is 0 remainder 3. So write the 0 on top of the bus stop and carry the remaining 3 to the next digit.
Step 2. (Orange)	Find 36 divided by 8. The answer is 4 remainder 4. So write the 4 on top of the bus stop and carry the remaining 4 to the next digit.
Step 3. (Yellow)	Find 47 divided by 8. The answer is 5 remainder 7. So write the 5 on top of the bus stop. The remainder is 7.
Answer:	367 ÷ 8 = 45r7

Pictorial and concrete methods to solve division calculations.

42 ÷ 3 =



$$\begin{array}{r} 1\;4 \\ 3\overline{)\,4\;{}^{1}2} \end{array}$$



Partition the dividend into tens and ones.

Start in the tens column counting groups of 3 (the divisor). Any remainders must be exchanged e.g. 1 ten = 10 ones.

You can also set your tens and ones counters out in arrays.

Remember to exchange so each group is equal.