

Abstract

Compact columnar method for addition.



ADDITION

add
plus
and
total



increase
more
sum
together

Addition tips...



Before you do an addition, especially

with large numbers,

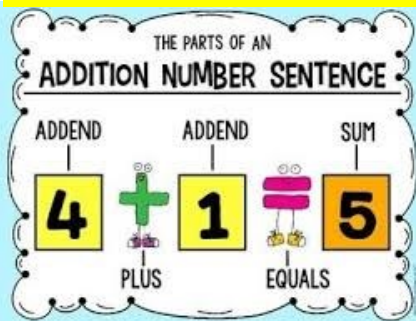
ESTIMATE!

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.

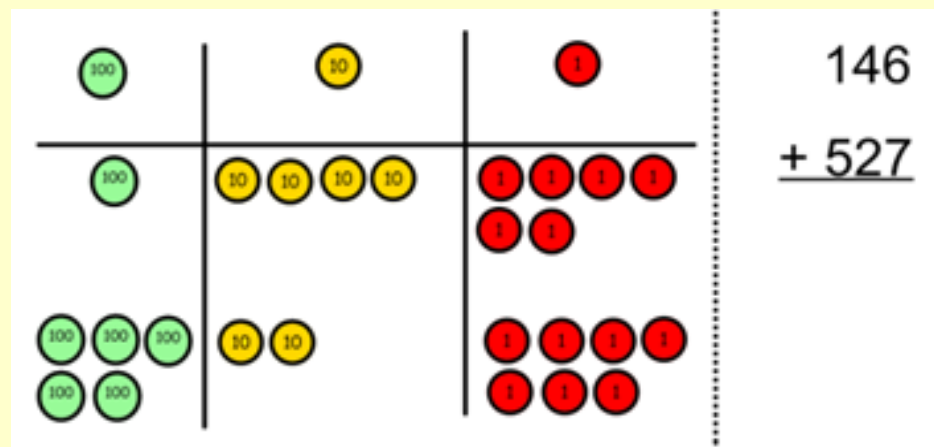


Step 1. Question	2,156 + 1,473 = Set out your calculation.	$\begin{array}{r} 2156 \\ + 1473 \\ \hline \end{array}$	
Step 2.	First add the ones. $6 + 3 = 9$	$\begin{array}{r} 2156 \\ + 1473 \\ \hline 9 \end{array}$	
Step 3.	Then add the tens. $5 + 7 = 12$ This is really 5 tens add 7 tens or $50 + 70 = 120$	$\begin{array}{r} 2156 \\ + 1473 \\ \hline 29 \\ 1 \end{array}$	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.	$\begin{array}{r} 2156 \\ + 1473 \\ \hline 629 \\ 1 \end{array}$	
Step 5.	Finally add the thousands. $2 + 1 = 3$ Remember, this is really 2 thousands add 1 thousand or $2,000 + 1,000 = 3,000$	$\begin{array}{r} 2156 \\ + 1473 \\ \hline 3629 \\ 1 \end{array}$	
Step 6. Answer	2,156 + 1,473 = 3,629 You can check this by doing the inverse.	$\begin{array}{r} 3629 \\ - 1473 \\ \hline 2156 \end{array}$	

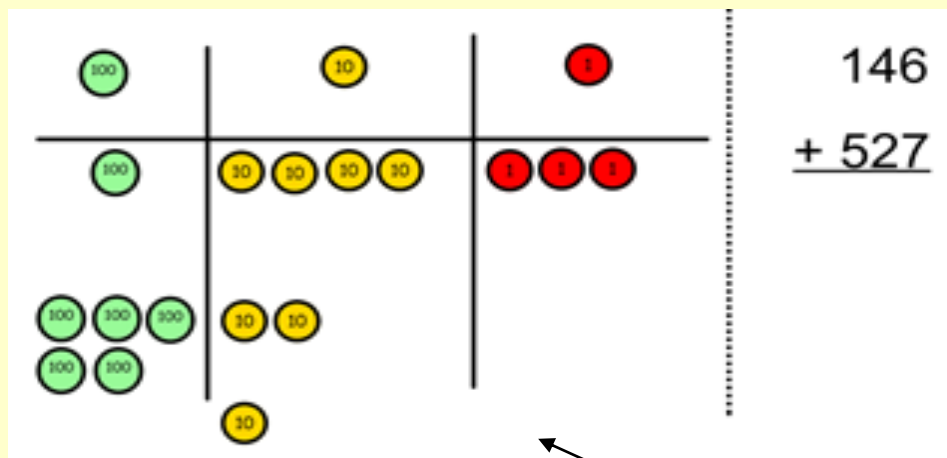
Concrete and Pictorial methods to solve addition calculations.



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.

$$6 - 1 = 5$$

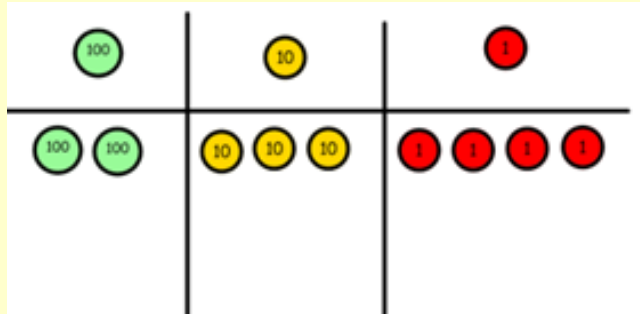
↑ ↑ ↑
 Minuend Subtrahend Difference

Step 1.	2,371 - 1,424 =	2 3 7 1
Question	Set out your calculation.	- 1 4 2 4
Step 2.	First subtract the ones. 1 - 4 won't work so exchange 1 ten into the ones column <u>SO</u> 11 - 4 = 7	2 3 ⁶ 7 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 7 1 - 1 4 <u>2</u> 4
Step 4.	Next subtract the hundreds. 3 - 4 won't work so exchange 1 thousand into the hundreds column <u>SO</u> 13 - 4 = 9	¹ 2 ¹ 3 ⁶ 7 1 - 1 4 <u>2</u> 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 2 ¹ 3 ⁶ 7 1 - 1 4 <u>2</u> 4
Step 6.	2,371 - 1,424 = 947	1 4 2 4
Answer	You can check this by doing the inverse.	+ <u>9 4 7</u> 2 3 7 1 1 1

Concrete and pictorial methods to solve subtraction calculations.

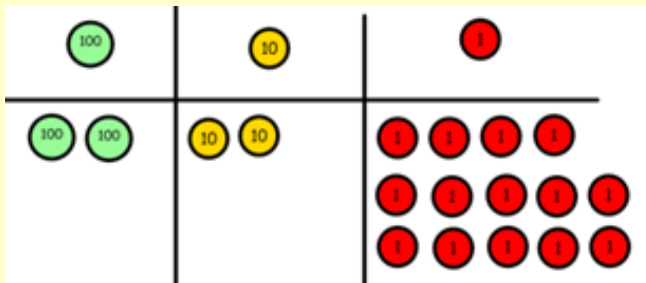


1. Make (draw) the larger number (minuend) with the place value counters.



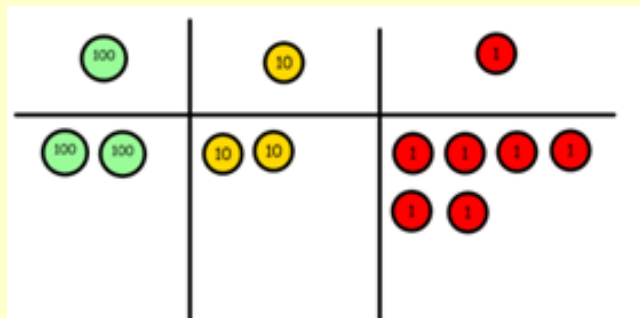
$$\begin{array}{r} 234 \\ - 188 \\ \hline \end{array}$$

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

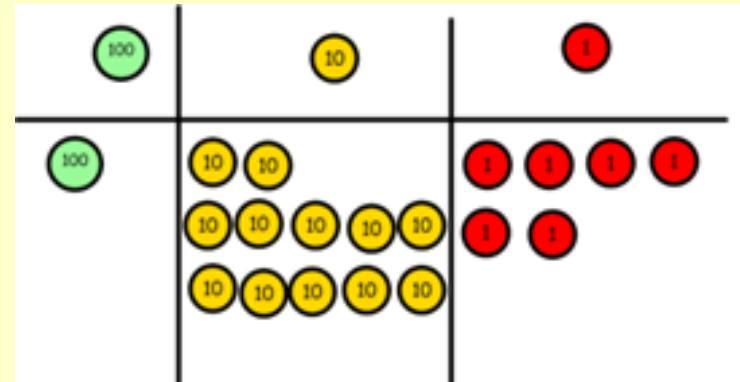


$$\begin{array}{r} 234 \\ - 188 \\ \hline \end{array}$$

Now I can subtract my ones.

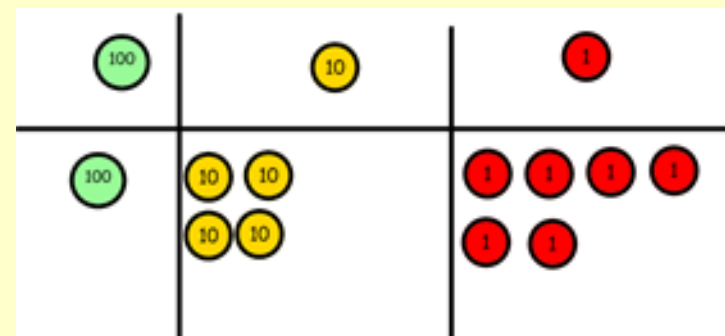


3. Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.



$$\begin{array}{r} 234 \\ - 188 \\ \hline 6 \end{array}$$

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



$$\begin{array}{r} 234 \\ - 188 \\ \hline 046 \end{array}$$

This works alongside the abstract method for subtraction.

$$0 + 40 + 6 = 46 \quad \text{so} \quad 234 - 188 = 46$$

Abstract

Expanded Method for Multiplication (2 or 3 digit x 1 digit).

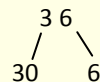


Step 1. $36 \times 4 =$

Question

Step 2. Partition 36.

Partition



Step 3. Write the calculation:

$$\begin{array}{r} 36 \\ \times 4 \\ \hline (4 \times 6) \\ \text{---} (4 \times 30) \end{array}$$

Step 4. Use your knowledge of place

Multiply

value e.g. $4 \times 3 = 12$ so

$$4 \times 30 = 120$$

$$\begin{array}{r} 36 \\ \times 4 \\ \hline 24 (4 \times 6) \\ \underline{120} (4 \times 30) \end{array}$$

Step 5. Add the products:

Add

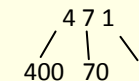
$$\begin{array}{r} \text{---} \\ 24 \\ + \underline{120} \\ \hline \underline{144} \end{array}$$

Step 6. $36 \times 4 = 144$

Answer

$471 \times 8 =$

Partition 471.



Write the calculation:

$$\begin{array}{r} 471 \\ \times 8 \\ \hline (8 \times 1) \\ (8 \times 70) \\ \text{---} (8 \times 400) \end{array}$$

471

$$\begin{array}{r} 471 \\ \times 8 \\ \hline 8 (8 \times 1) \\ 560 (8 \times 70) \\ \underline{3200} (8 \times 400) \end{array}$$

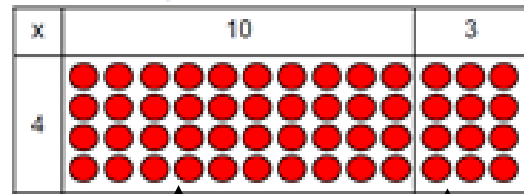
Add the products:

$$\begin{array}{r} \text{---} \\ 8 \\ 560 \\ + \underline{3200} \\ \hline \underline{3768} \end{array}$$

$471 \times 8 = 3768$

Pictorial methods to solve multiplication calculations.

Link arrays with the grid method.



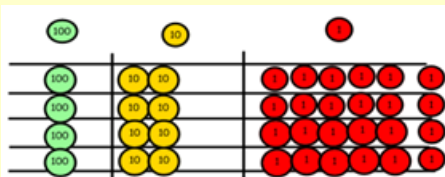
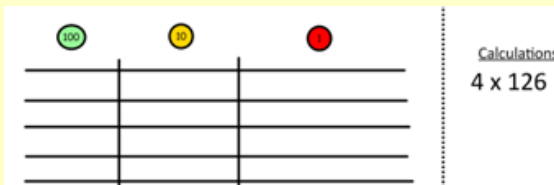
4 rows of 10
4 rows of 3

$$\begin{array}{r} 40 \\ + 12 \\ \hline 52 \end{array}$$

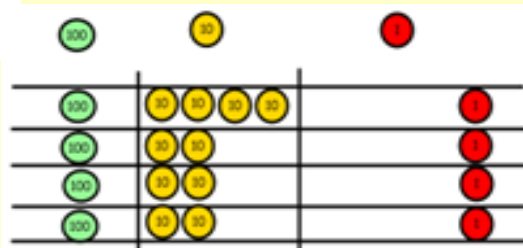
$4 \times 10 = 40$

$3 \times 4 = 12$

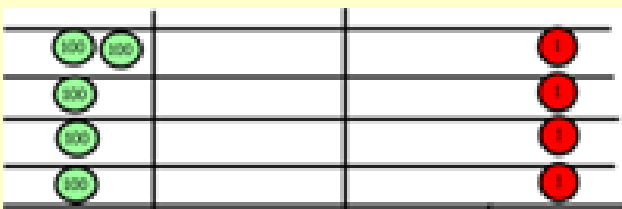
1. Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.



2. Fill each row with 126.



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

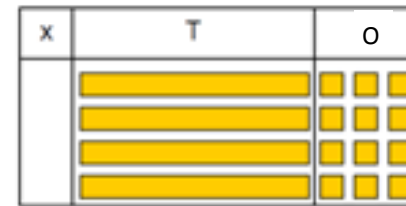


4. Then you have your answer.

Concrete methods to solve multiplication calculations.



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



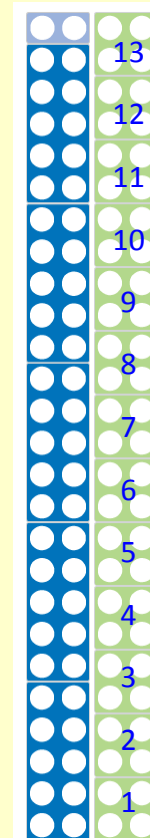
4 rows of 13

Using Numicon

$13 \times 4 = 52$

Put 13 4s in a train.

Then put tens alongside to count the total quickly.



Abstract

$$\begin{array}{r} 062r2 \\ 6 \overline{) 374} \\ \underline{3} \\ 7 \\ \underline{6} \\ 14 \\ \underline{12} \\ 2 \end{array}$$



Division tips...

Write the times table of the divisor out to 10 times before you begin.

$1 \times 6 = 6$

$6 \times 6 = 36$

$2 \times 6 = 12$

$7 \times 6 = 42$

$3 \times 6 = 18$

$8 \times 6 = 48$

$4 \times 6 = 24$

$9 \times 6 = 54$

$5 \times 6 = 30$

$10 \times 6 = 60$

The Bus Stop Method for Division



$$\begin{array}{ccccccc} 374 & \div & 6 & = & 62 & r & 2 \\ \uparrow & & \uparrow & & \uparrow & & \uparrow \\ \text{Dividend} & & \text{Divisor} & & \text{Quotient} & & \text{Remainder} \end{array}$$

Step 1

$374 \div 6 =$

Question

Set - out your question with the divisor before the bus stop and the dividend below.

Step 2

$3 \div 6 = 0 r 6$

(RED)

Because the divisor is larger than the dividend, the 3 will carry into the tens column.

Hundreds

Step 3

$37 \div 6 = 6 r 1$

(ORANGE)

Look at your 6 times tables to see $6 \times 6 = 36$. The 1 remainder will carry into the ones column.

Tens

Step 4

$14 \div 6 = 2 r 2$

(BLUE)

Look at your 6 times table again to see $6 \times 2 = 12$. The 2 remainders will stay as remainders.

Ones

Step 5

$374 \div 6 = 62 r 2$

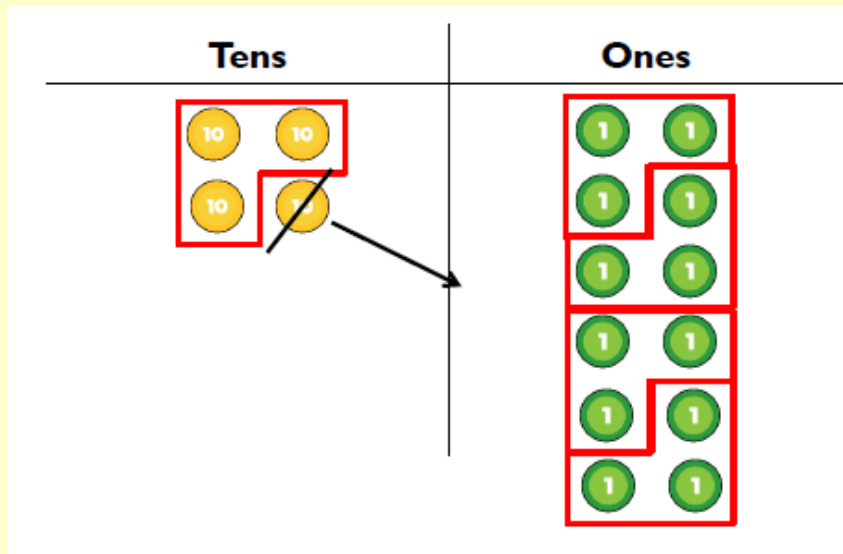
Answer

You can check this with the chunking method on a number line.

Pictorial and concrete methods to solve division calculations.



$$42 \div 3 =$$



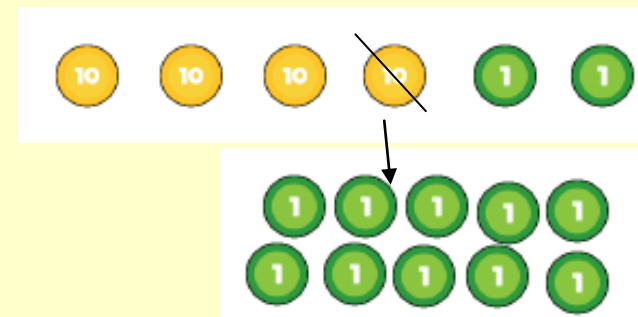
$$\begin{array}{r} 14 \\ 3 \overline{) 42} \\ \underline{30} \\ 12 \\ \underline{12} \\ 0 \end{array}$$

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.



Tens	Ones
10	1 1 1 1
10	1 1 1 1
10	1 1 1 1