

Calculation Workshop

Addition and Subtraction Strategies in KS2

Mrs. McBrien February 9TH 2017



Aims of the session

- ▶ To examine the progression of written methods for addition and subtraction through KS2
- ▶ To practise the different strategies used in different year groups

Why do we need a whole school Calculation Policy.....

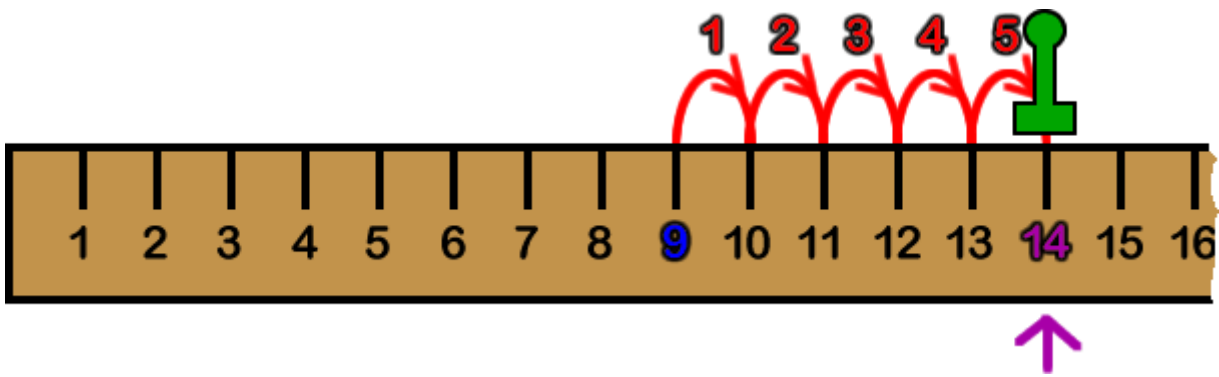
- ▶ New Curriculum 2014 states what calculation methods the pupils should be using at the end of each key stage.
- ▶ Emphasis on the use of formal calculation methods by the end of Year 6.
- ▶ Calculation Policy gives a clear pathway showing the route pupils will make to master the calculation methods.
- ▶ Establish consistency and progression through the whole school

End of KS2- Summer Term 1

Children will have to sit 3 maths papers:

1 Arithmetic paper

2 Mathematical Reasoning papers



Addition

$$\begin{array}{r} 38 \\ + 93 \\ \hline 131 \\ \hline 1 \end{array}$$

KS2 Paper

5 = 936 + 285

7 89,994 + 7,643 =

3.005 + 6.12 =

16 15.98 + 26.314 =

What are the misconceptions?

Example 1

$$\begin{array}{r} \text{H T O} \\ 760 \\ + \underline{240} \\ \hline 990 \end{array} \quad \begin{array}{r} \text{H T O} \\ 729 \\ + \underline{111} \\ \hline 839 \end{array}$$

Example 2

$$\begin{array}{r} \text{H T O} \\ 136 \\ + 75 \\ \hline 886 \end{array}$$

Example 3

$$\begin{array}{r} \text{T O} \\ 34 \\ + 18 \\ \hline 412 \end{array}$$

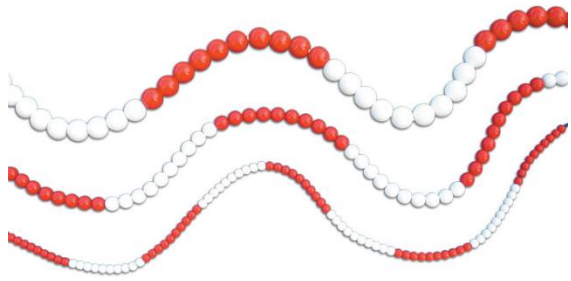
Example 4

$$\begin{array}{r} \text{T O} \\ 45 \\ + 138 \\ \hline 81 \end{array}$$

Example 5

$$\begin{array}{r} \text{T O} \\ 57 \\ + 314 \\ \hline 81 \end{array}$$

Manipulatives -Deepening conceptual understanding



Bead strings



Cuisenaire Rods



Numicon



Dienes



Place value counters



Place value arrow cards

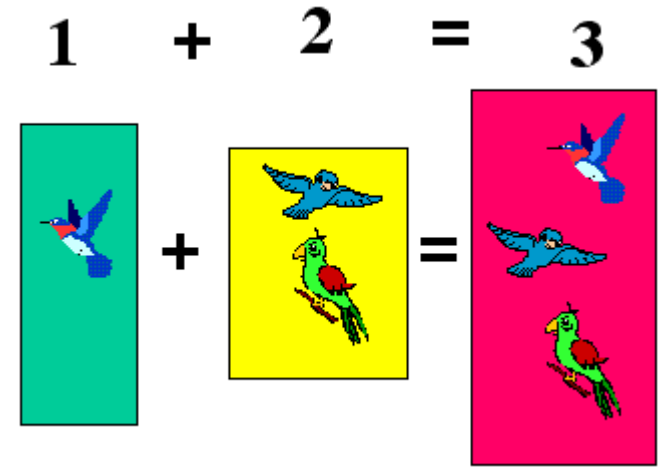
Progression in written methods for Addition :

▶ STAGE 1 Practical (combining) and adding on
(increasing) **KS1**

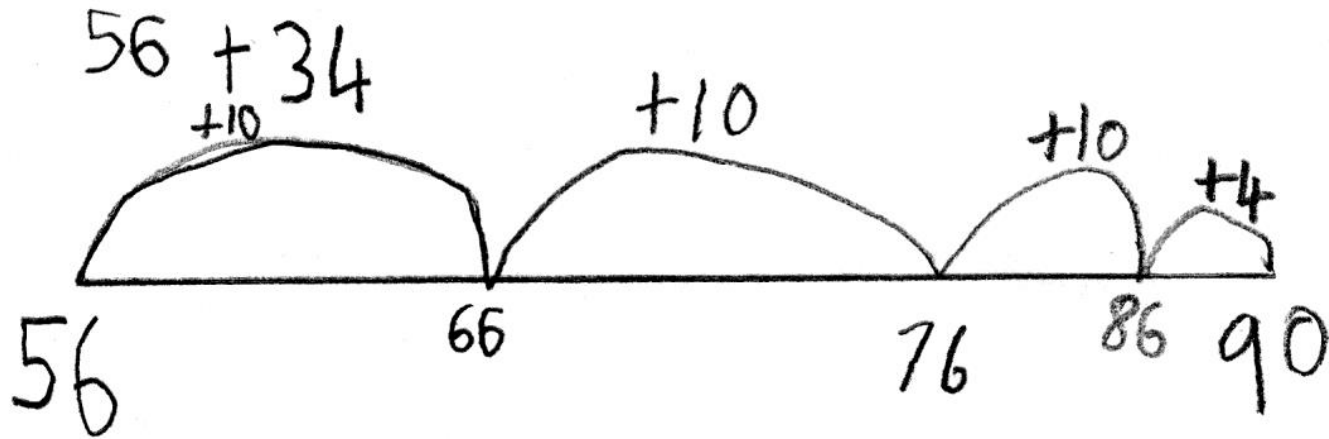
▶ STAGE 2 Number Tracks and Number Lines **Y1-Y3**

▶ STAGE 3 Partitioning (expanded columnar method) **Y2- Y3**

▶ STAGE 4 Efficient (column method) **Y3-Y6**

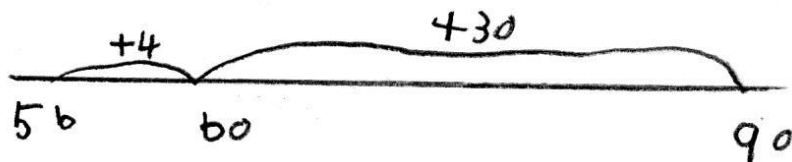


Stage 2 : Number Lines



Here the child starts with 56 and has made 3 jumps of 10 and then a jump of 4 to add 34.

$$56 + 34$$



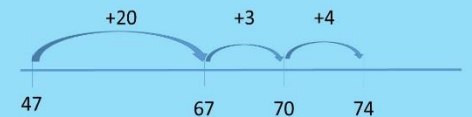
This child has made the jump of 4 to get to the multiple of 10 and then added the 30 in a single jump.

Stage 2: Have a go

Draw a blank number line on your piece of paper.
Use it to work out the answer to this calculation.

$$36 + 59 =$$

**Addition Using the Empty
Number Line**



$$47+27=74$$

Stage 3 : Partitioning (Expanded)

$$243 + 351 = 594$$

$$200 + 40 + 3$$

$$300 + 50 + 1$$

$$500 + 90 + 4$$

$$594$$

Using Dienes apparatus, make 148 and 47 on your Calculation Mat.

100s	10s	1s	
100	40	8	
	40	7	
100	80	15	195

Stage 3 : Expanded Method

Expanded Addition using Place Value Counters

http://mathsframe.co.uk/en/resources/resource/241/Expanded_Addition_using_Place_Value_Counters



Stage 3 : Expanded Method

Stage 4 : Efficient Column Method

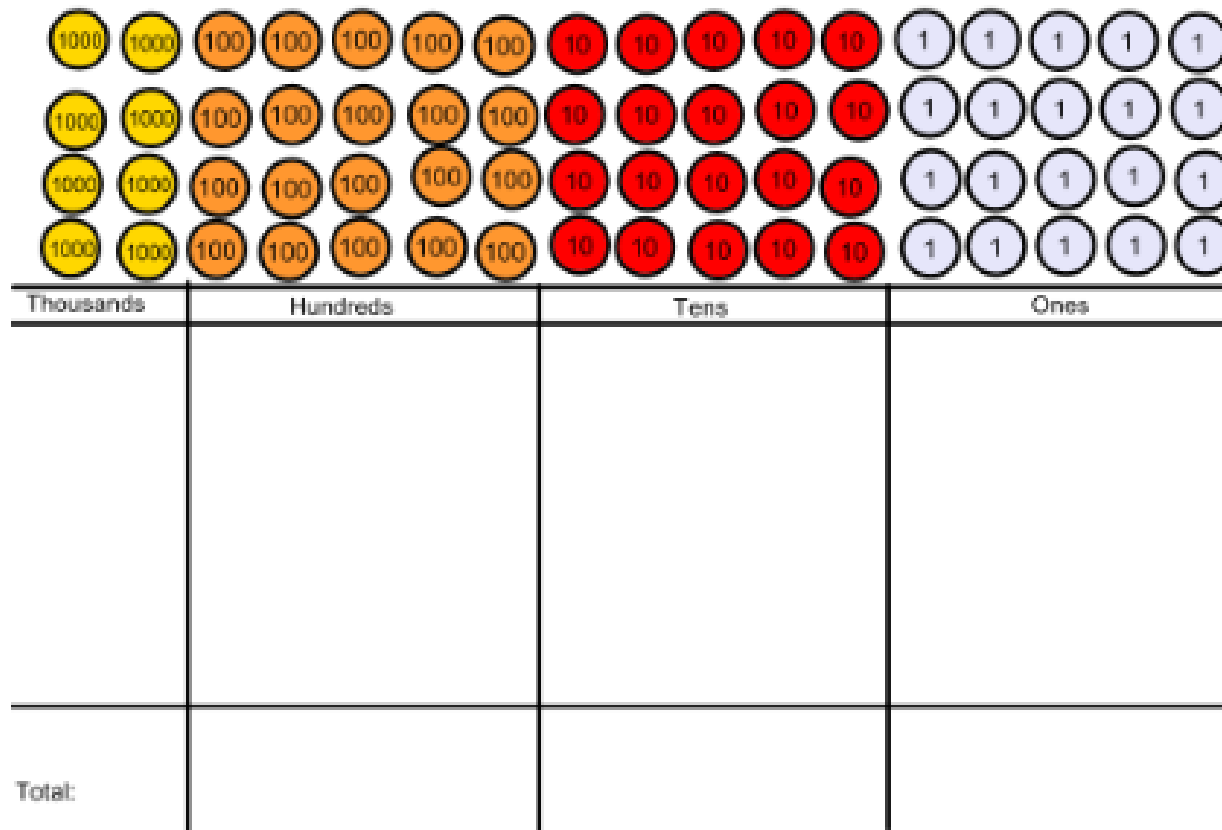
$$\begin{array}{r} 381 \\ 97+ \\ \hline 478 \\ \downarrow \end{array}$$

$$346 + 246 =$$

	H	T	O
	3	4	6
+	2	4	6
<hr/>			

Stage 4 : Column Method

Use your Place Value counters to solve
 $459 + 366 =$



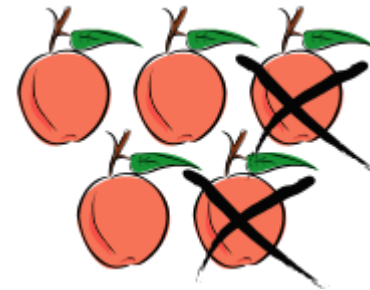
Stage 4 : Column Method



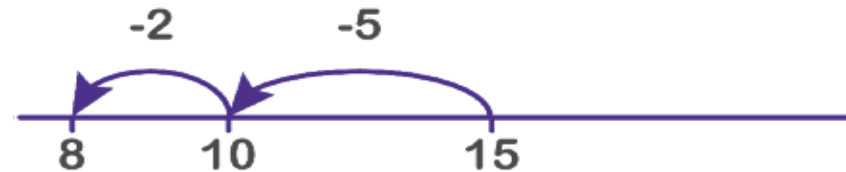
SUBTRACTION

Subtraction

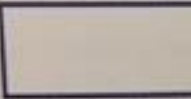
$$\begin{array}{r} \overset{6}{\cancel{7}}4 \\ - 27 \\ \hline 47 \end{array}$$



$$15 - 7 = 8$$

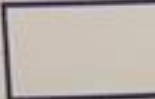


KS2 Paper

$$125.48 - 72.3 =$$


18

$$122,456 - 11,999 =$$


$$4 - 1.15 =$$


$$\boxed{} = 435 - 30$$

What are the misconceptions?

Example 1

$$\begin{array}{r} \text{T O} \\ 65 \\ - 27 \\ \hline 42 \end{array}$$

Example 2

$$\begin{array}{r} \text{T O} \\ \cancel{7} 2 \\ - 34 \\ \hline 32 \end{array}$$

Example 3

$$\begin{array}{r} \text{T O} \\ 72 \\ - 34 \\ \hline 48 \end{array}$$

Example 4

$$\begin{array}{r} \text{T O} \\ 80 \\ - 45 \\ \hline 40 \end{array}$$

Example 5

$$\begin{array}{r} \text{H T O} \\ 29\cancel{0}4 \\ - 76 \\ \hline 228 \end{array}$$

Progression in written methods for Subtraction :

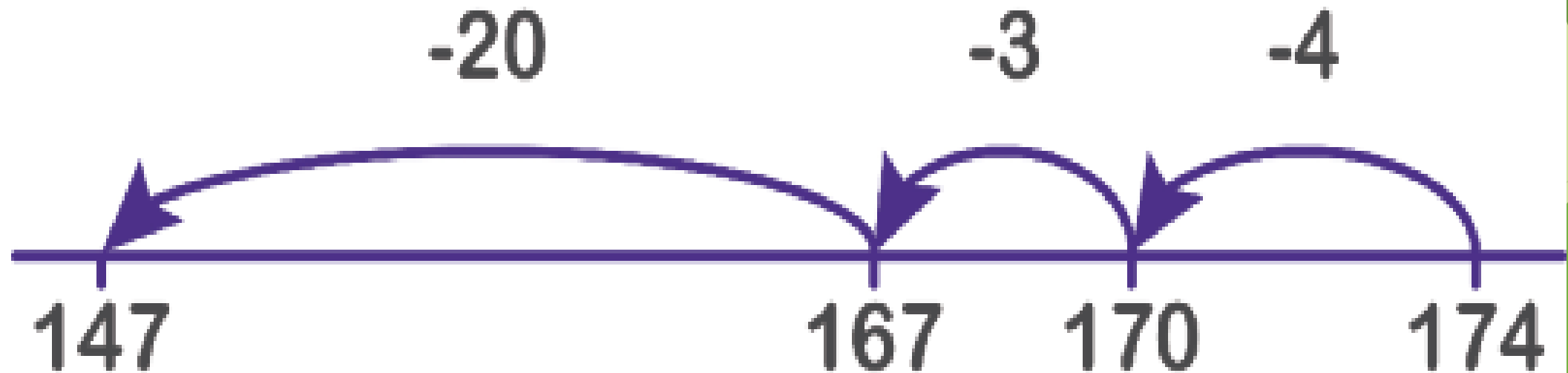
$$\begin{array}{r} 35 \\ -19 \\ \hline \end{array} \longrightarrow \begin{array}{r} \overset{2}{\cancel{3}} \overset{15}{\cancel{5}} \\ -19 \\ \hline 16 \end{array}$$

- ▶ STAGE 1 Practical (taking away) **KS1**
- ▶ STAGE 2 Number Tracks and Number Lines **Y1-Y3**
- ▶ STAGE 3 Partitioning (expanded columnar method) **Y2 + Y3**
- ▶ STAGE 4 Efficient (column method) **Y3-Y6**

Stage 2 Number Lines

Counting back

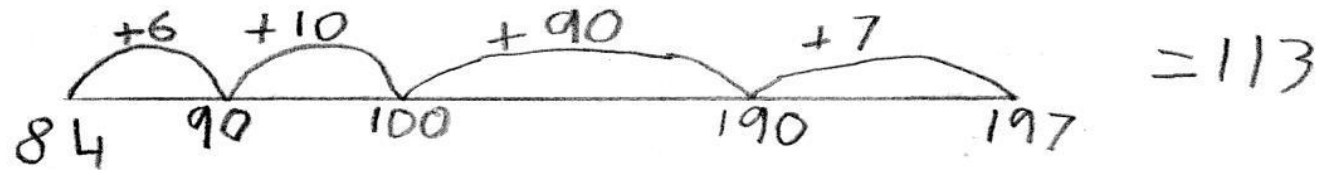
$$174 - 27 = 147$$



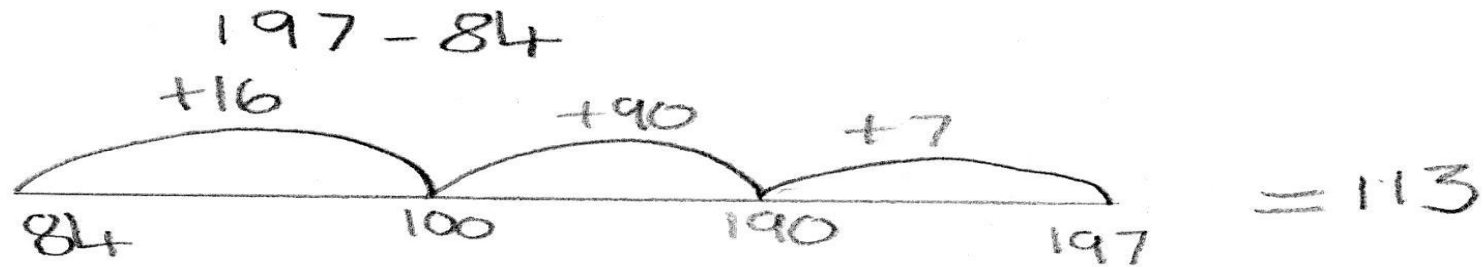
Stage 2 Number Lines

Counting on

$$\underline{197 - 84}$$



Child A has made 4 jumps to find the difference between 84 and 197.

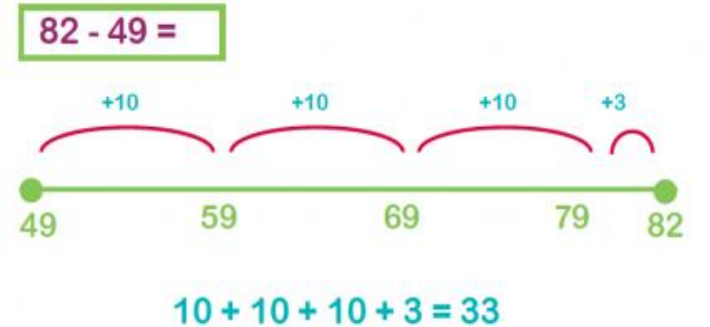


Child B has made 3 jumps and can jump from 84 to 100 in a single jump

Stage 2: Have a go

Draw a blank number line on your piece of paper.
Use it to work out the answer to this calculation.

$$133 - 76 =$$



Stage 3 : Partitioning (Expanded)

$$84 - 38 = 46$$

$$\begin{array}{r} \overset{70}{80} \\ - 30 \\ \hline 40 \end{array} \quad \begin{array}{r} \overset{1}{4} \\ - 8 \\ \hline 6 \end{array}$$

$$46$$

Using Dienes apparatus show the calculation
 $83 - 58 =$ on your calculation mat

1 0 0 s	1 0 s	1 s	
	8 0	3	
-	5 0	8	

Stage 3 : Expanded Method

Using Dienes apparatus show the calculation
 $83 - 58 =$ on your calculation mat

1 0 0 s	1 0 s	1 s	
	⁷⁰ 8 0	¹ 3	
-	5 0	8	
	2 0	5	2 5

Stage 3 : Expanded Method

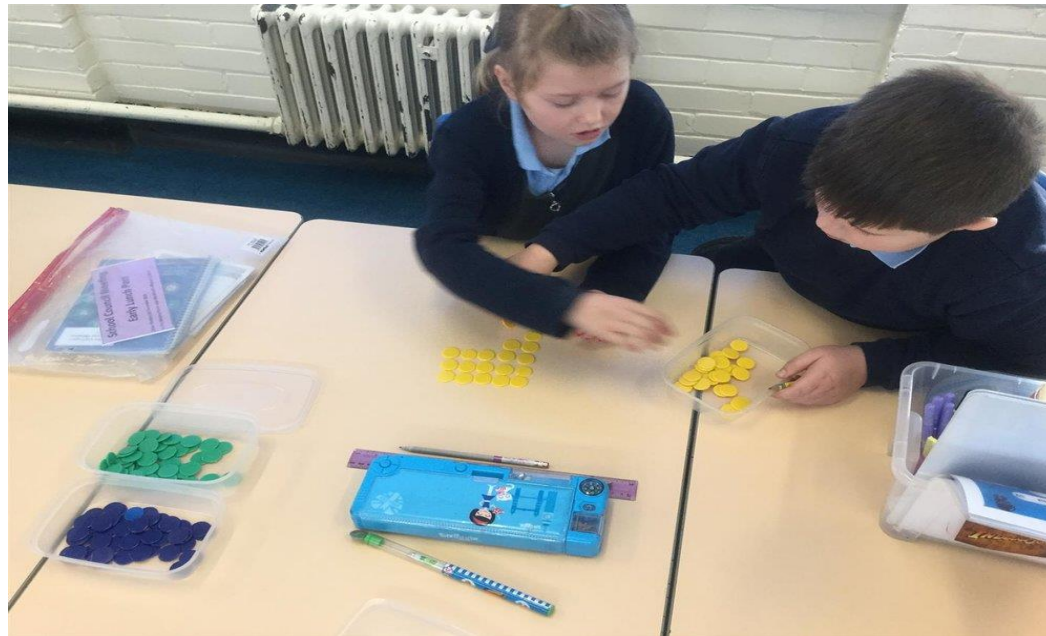
Using place value counters carry out the calculation

$$134 - 66 =$$

on your Calculation Mat.

Remember to write the expanded calculation alongside.

http://mathsframe.co.uk/en/resources/resource/242/Column_Subtraction_using_Place_Value_Counters



Stage 4 : Efficient Column Method

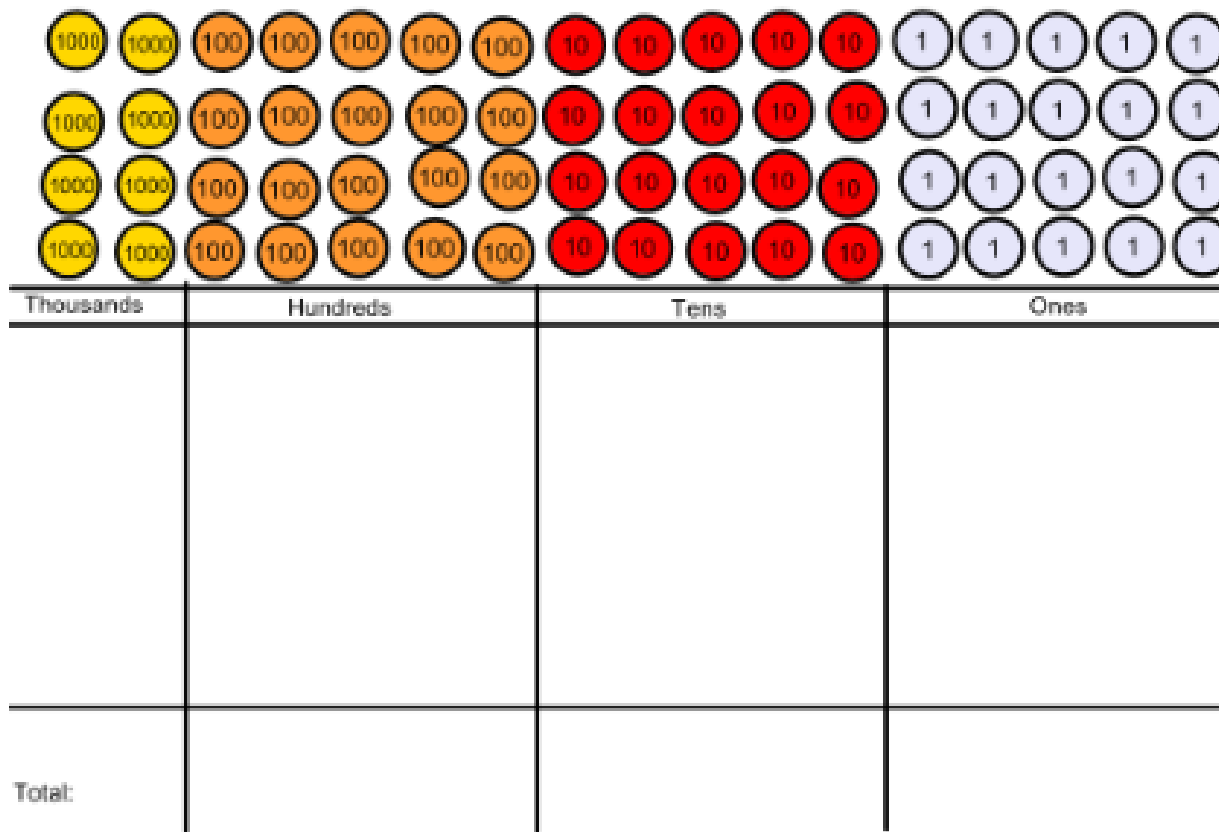
$$\begin{array}{r} \overset{8}{\cancel{9}} \overset{1}{5} \\ - 28 \\ \hline 67 \end{array}$$

$$346 - 87 =$$

	H	T	O
	3	4	6
-		8	7
<hr/>			

Stage 4 : Column Method

Use your Place Value counters to solve
 $414 - 136 =$



Stage 4 : Column Method

Thank you very much for
coming and for joining in
with such enthusiasm