HEATHERSIDE JUNIOR SCHOOL

Progression and Reasoning in

Addition and Subtraction

Information Evening

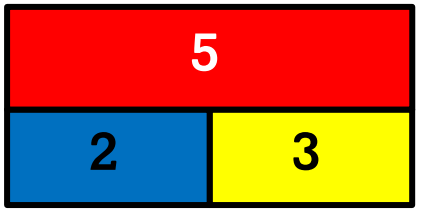
Thursday 10th January 2019

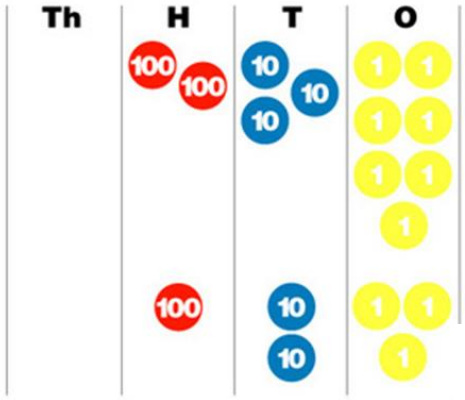
By the end of Year 2

Children are expected to be able to:

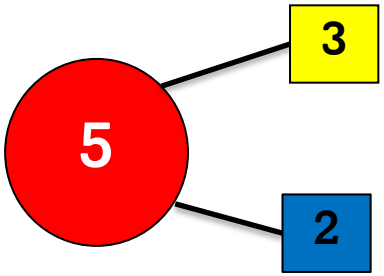
- solve problems with addition and subtraction using objects and pictures, including number lines and hundred squares;
- recall and use addition facts to 20 and use related facts up to 100;
- add and subtract up to two 2-digit numbers;
- understand that addition can be done in any order, but subtraction cannot;
- recognise and use the inverse relationship between addition and subtraction to check calculations and solve missing number problems.

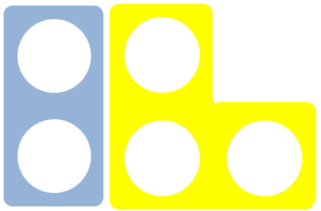
What will they see?



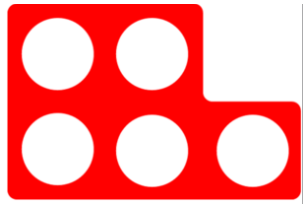


$$\begin{array}{r} 237 \\ +\,123 \\ \hline \end{array}$$

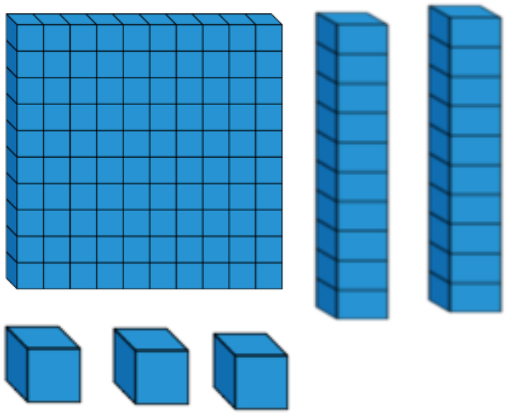


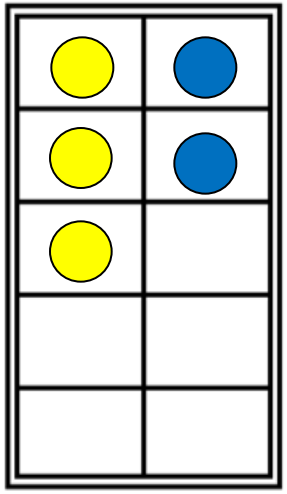


Multiple representations



123



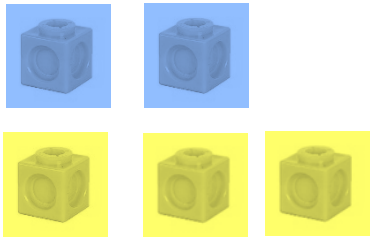


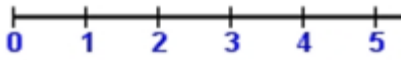
$2 + 3 = 5$

$3 + 2 = 5$

$5 - 3 = 2$

$5 - 2 = 3$

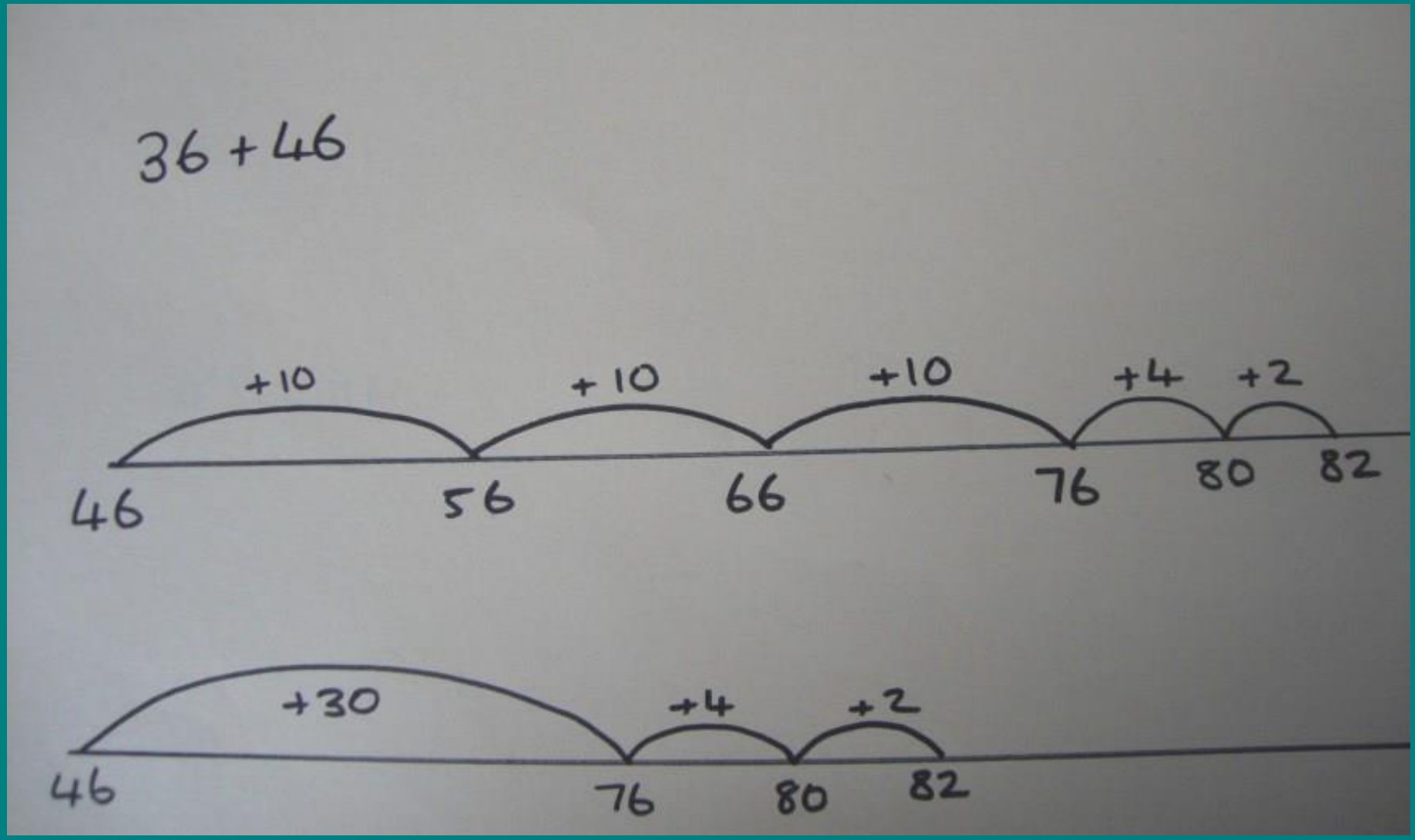




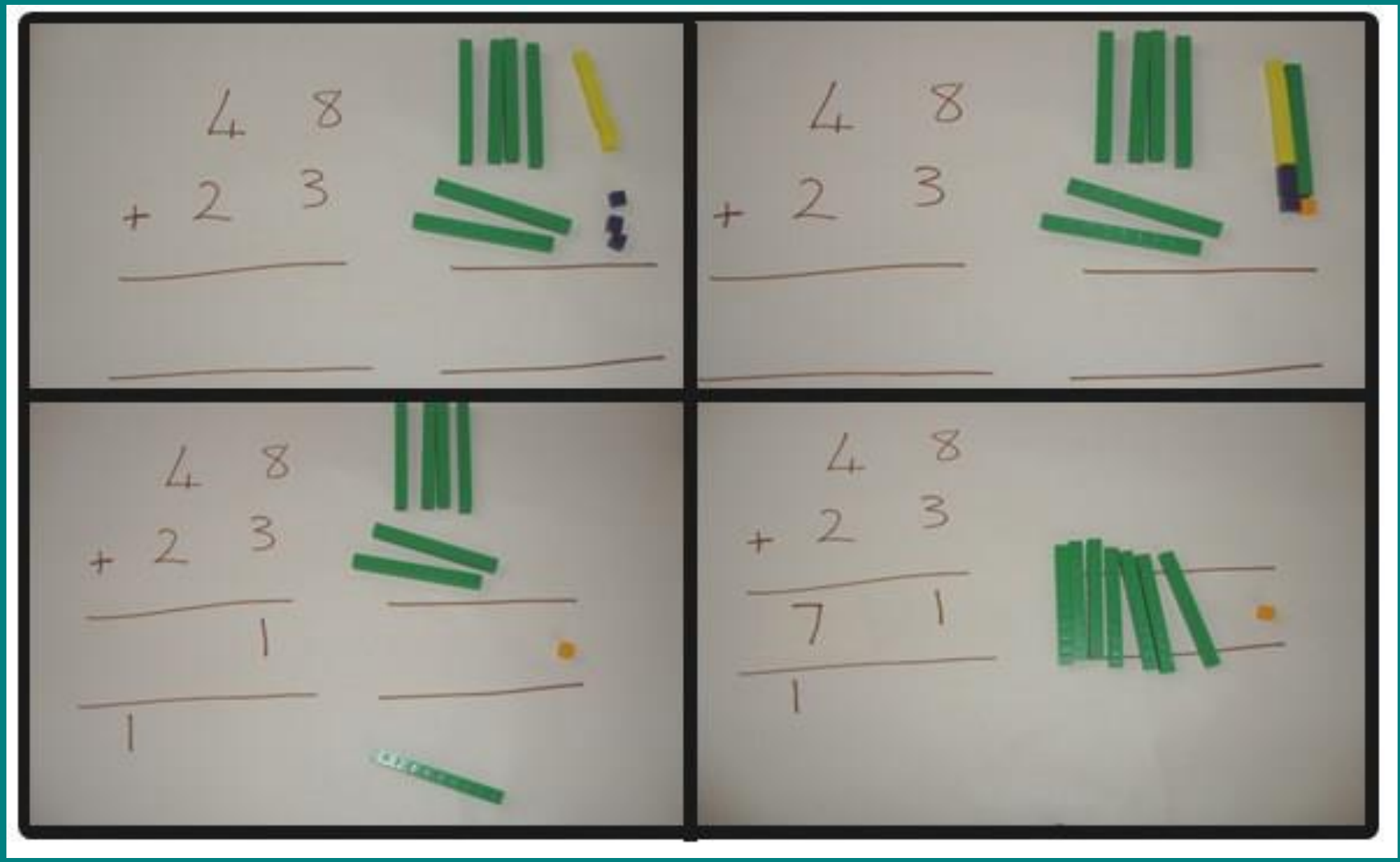
Progression in ADDITION

add and count on
addition plus
more sum total
altogether increase

Informal jottings to support mental strategies



Use of practical apparatus to model formal written methods



By the end of Year 3
Children are expected to be able to:

add numbers with up to 3-digits, using formal column addition.

In order to do this children are taught to partition the numbers in columns, adding the units first.

For example: 163 + 35 =

$$\begin{array}{r} 100 + 60 + 3 \\ +\quad\quad 30 + 5 \\ \hline 100 + 90 + 8 = 198 \end{array}$$

Children are then expected to be able to add up to two 3-digit numbers by partitioning in columns with carrying.

For example: 258 + 136 =

$$
\begin{array}{rrrrr}
 & 200 & + & 50 & + & 8 \\
+ & 100 & + & 30 & + & 6 \\
\hline
 & 300 & + & 90 & + & 4 = 394
\end{array}
$$

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Children are also expected to be able to estimate the answer to a calculation and use the inverse operation to check their answers.

From Year 4 Children will then use the compact column method to add 2 or more numbers, using place value indicators alongside concrete apparatus and other visual models.

For example: 325 + 243 =

H	T	U
3	2	5
+ 2	4	3
5	6	8

Once secure with concrete apparatus and other visual models, children will then use the compact method to add four-digit numbers with carrying.

For example: 2,286 + 1,147 =

	Th	H	T	U
	2,	2	8	6
+	1,	1	4	7
	3,	4	3	3
		1		1

In the context of money and measures, including decimals.

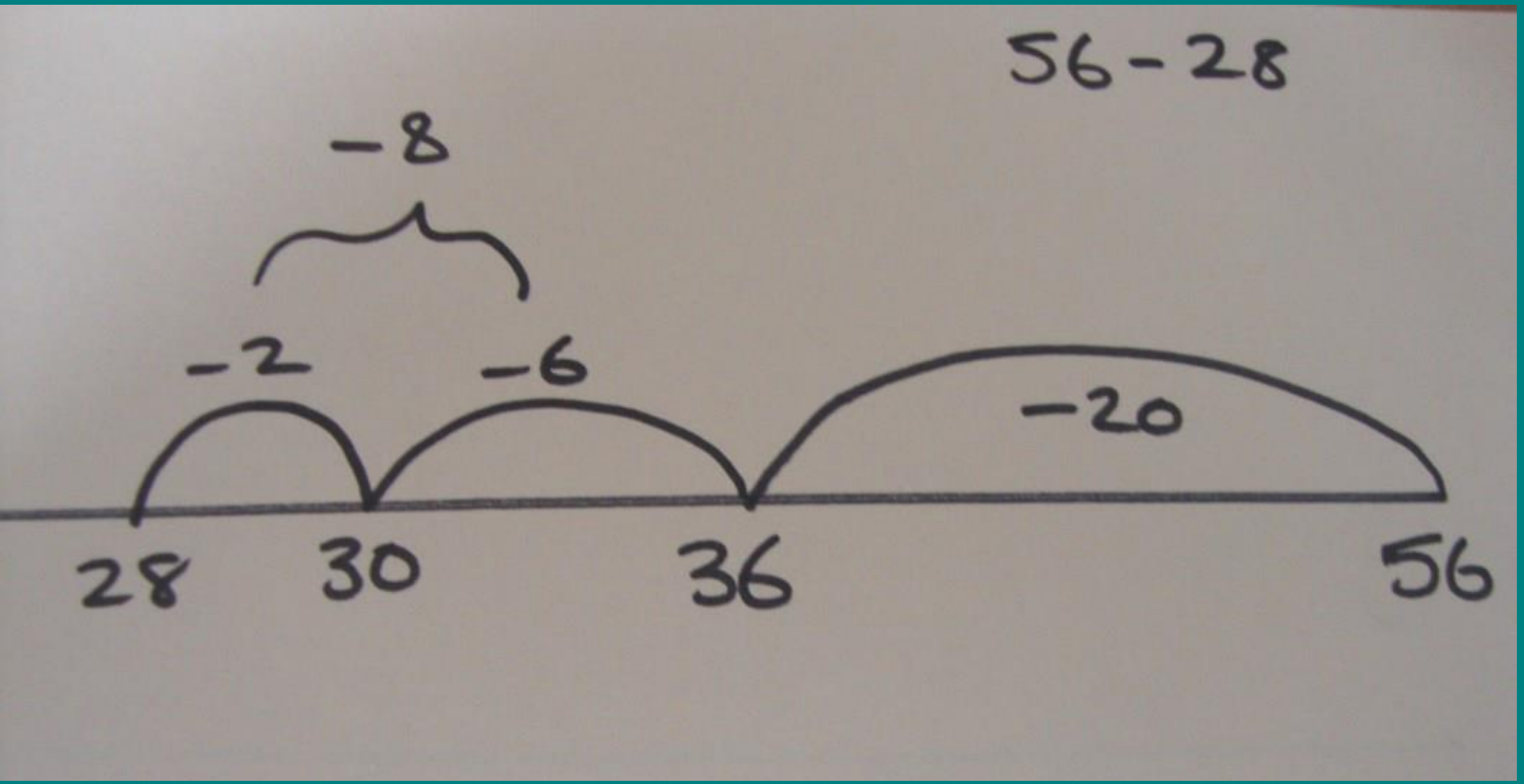
In Year 5 children will add numbers with more than four digits.

Progression in SUBTRACTION

Key Vocabulary

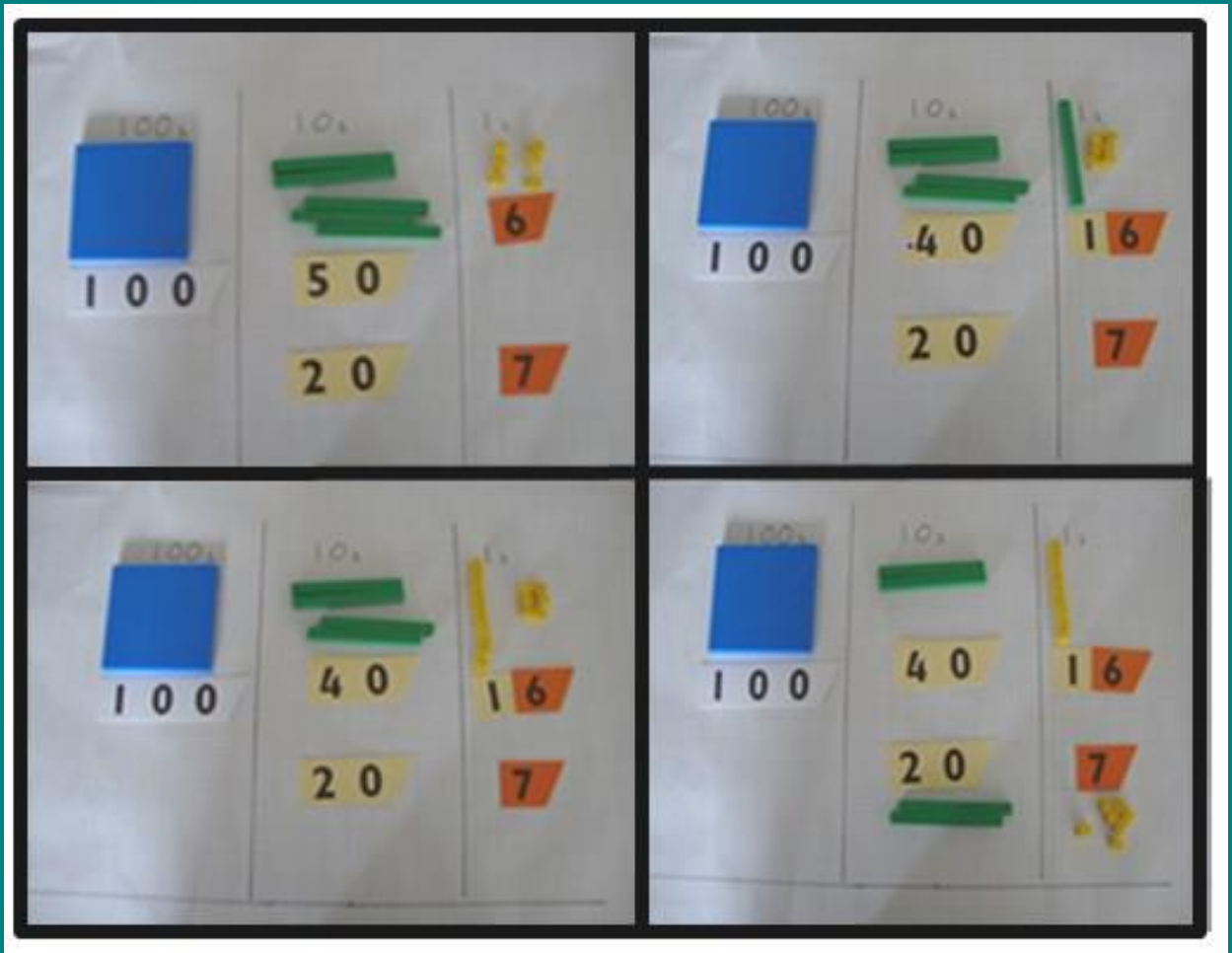
- subtract
- take away
- minus
- count back / up
- less than
- fewer
- difference

Informal jottings to support mental strategies



Use of practical apparatus to model formal written methods

156 - 27 = 129



By the end of Year 3, children are expected to be able to:

- subtract with numbers up to 3-digits.

For example:
287 - 135 =

200 and 80 and 7
- 100 and 30 and 5
100 and 50 and 2 = 152

As with addition, children will be taught to partition the numbers and then subtract the units first.

Children are then expected to be able to subtract up to two 3-digit numbers by partitioning in columns **with exchanging.**

For example:
43 – 27=

30	and	13		
~~40~~	and	~~3~~		
– 20	and	7		
10	and	6	=	16

Children will be taught that in order to subtract 7 from 3 it is necessary to exchange ten and add it to the 3 to make 13.

At this stage, it is not explained in terms of exchanging from the tens column.

In Year 4, children will then use the compact column method to subtract 2 numbers, using place value indicators without exchanging.

For example: 278 - 145 =

	H	T	U
	2	7	8
-	1	4	5
	1	3	3

Children will then use the compact method to subtract two numbers, using place value indicators with exchanging.

For example: 267 - 149=

H	T	U
	5	
2	~~6~~	17
- 1	4	9
1	1	8

The compact column method is then extended to 4-digit numbers with exchanging across more than one place value column, including where there is a 0 in the top number.

For example: 2404 - 1146 =

Th	H	T	U
	3	9	
2,	~~4~~	1 ~~0~~	14
- 1,	1	4	6
1,	2	5	8

In Year 5 children will subtract numbers with more than four digits, including decimals.

GLOSSARY

Number Bonds – pairs of numbers which make a given total (eg number bonds to 10: 1 + 9; 2 + 8; 3 + 7 …)

Partition – splitting a number up (eg 123 = 100 + 20 + 3)

Recombine - putting a number back together (eg 100 + 20 + 3 = 123)

Bridging – crossing over 10 or 100 etc

Exchanging – when subtracting, swapping a 10 for 10 units etc

Place Value – the value of each digit in a number eg hundreds, tens and units (ones)

Inverse - the opposite, related operation: addition/subtraction; multiplication/division

Expanded method – a calculation method showing each step in a calculation

Compact method – a calculation method where the steps are combined and not explicitly shown