Amblecote Primary School

Written Calculation Policy for Mathematics

As school we follow the guidance from
White Rose Maths

Key vocabulary for + - X ÷ written calculations

Addition	Subtraction	Multiplication	Division	Equals
Add	Between	Altogether	divide into	Balance
And	difference	Arrays	divide by	Equals to
Addition	decrease	By	divisible by	Equivalent
Altogether	fewer	groups of	division	Same as
Increase	inverse of +	inverse of ÷	half	Same value
inverse of –	minus	lots of	inverse of x	
make	subtract	multiply	remainder	
more	subtraction	multiply by	quotient	
plus	take away	multiple of	share equally	
sum	less than	product		
total		times		
		twice/double etc		

Early Years Foundation Stage (based on statutory framework for the Early Tears Foundation Stage 2021)			
Addition	Subtraction	Multiplication	Division
Count sets of objects reliably up to twenty. Combining two parts to make a whole. Start at a bigger number and count on. Regrouping to make ten (number bonds)	Taking away ones Counting back Finding a missing part, given a whole and a part. Subtracting within 10	Double a number up to 10 Counting in 2s, 5s and 10s up to 20	Sharing objects up to 10 equally

<u>ELG: Number:</u> Children at the expected level of development will:

- Have a deep understanding of number to 10, including the composition of each number; 14

- Subitise (recognise quantities without counting) up to 5;

- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

<u>ELG: Numerical Patterns:</u> Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system;

- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;

- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

<u>Mathematics</u>

Mathematics Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

Addition +

Concrete	Pictorial	Abstract
➢ These are visual images of the actual resources to use within the classroom. ➢ Use a range of different practical resources. (e.g.base 10, place value counters, straws)	➢ These are pictorial representations that may appear in pupil's work. ➢ These can also be completed practically when needed.	➢ These can be number lines, bar models, Part-part whole, formal methods

Counting and adding more

EYFS

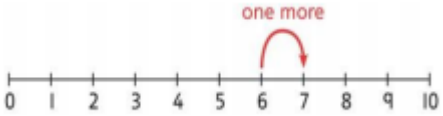
Children add one more person or object to a group to find one more.

Use a range of resources e.g. cars, eggs, shells, teddy bears.

Children add one more cube or counter to a group to represent one more

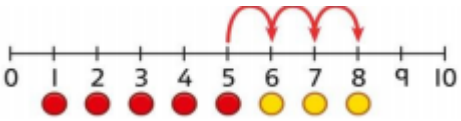
One more than 4 is 5.

Use a number line to understand how to link counting on with finding one more

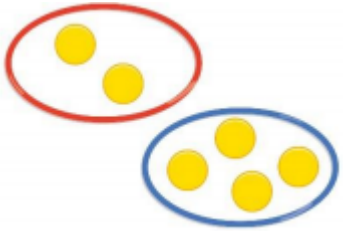
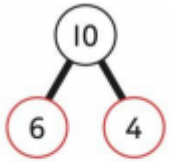
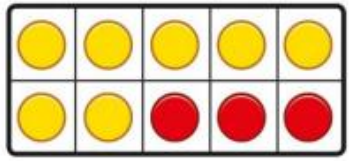
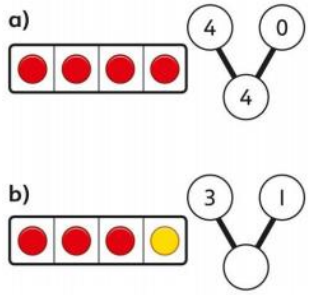


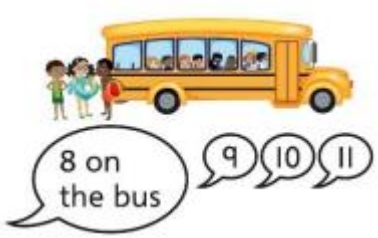
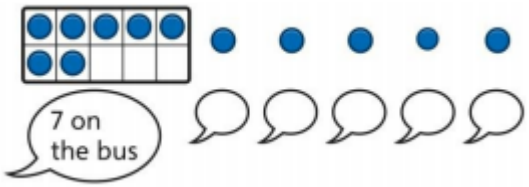
One more than 6 is 7.
7 is one more than 6.

Learn to link counting on with adding more than one.

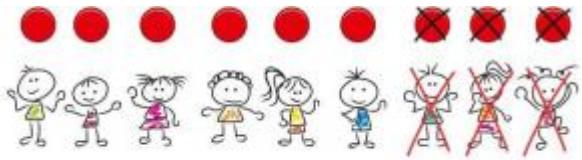
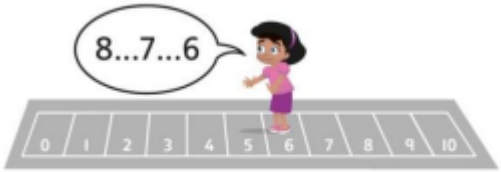


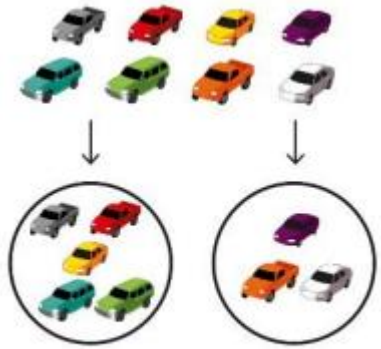
5 + 3 = 8

<table>
<tr><th colspan="4">Understanding part-part-whole relationship</th></tr>
<tr>
<td>EYFS</td>
<td>Sort people and objects into parts and understand the relationship with the whole.
 
The parts are 2 and 4. The whole is 6.</td>
<td>Children draw to represent the parts and understand the relationship with the whole.
 
The parts are 1 and 5. The whole is 6.</td>
<td>Use a part-whole model to represent the numbers.
 
 
6 + 4 = 10</td>
</tr>
<tr><th colspan="4">Knowing and finding number bonds within 10</th></tr>
<tr>
<td>EYFS</td>
<td>Break apart a group and put back together to find and form number bonds.
 
3 + 4 = 7
 
6 = 2 + 4</td>
<td>Knowing and finding number bonds within 10 Use five and ten frames to represent key number bonds.
  5 = 4 + 1
  10 = 7 + 3</td>
<td>Use a part-whole model alongside other representations to find number bonds. Make sure to include examples where one of the parts is zero.
 
4 + 0 = 4
3 + 1 = 4</td>
</tr>
</table>

Adding by counting on			
EYFS	Children use knowledge of counting to 20 to find a total by counting on using people or objects  	Children use counters to support and represent their counting on strategy.  	

Subtraction -

	Concrete	Pictorial	Abstract
	➢ These are visual images of the actual resources to use within the classroom. ➢ Use a range of different practical resources. (e.g.base 10, place value counters, straws)	➢ These are pictorial representations that may appear in pupil's work. ➢ These can also be completed practically when needed.	➢ These can be number lines, bar models, Part-part whole, formal methods
Counting back and taking away			
EYFS	Children arrange objects and remove to find how many are left.  1 less than 6 is 5. 6 subtract 1 is 5.	Children draw and cross out or use counters to represent objects from a problem.  9 – ☐ = ☐ There are ☐ children left.	Children count back to take away and use a number line or number track to support the method.  *9 – 3 = 6*

Finding a missing part, given a whole and a part			
EYFS	Children separate a whole into parts and understand how one part can be found by subtraction  8 – 5 = ?		
Subtraction within 10			
EYFS	Understand when and how to subtract 1s efficiently. Use a bead string to subtract 1s efficiently.  5 – 3 = 2	Understand when and how to subtract 1s efficiently.  5 – 3 = 2	Understand how to use knowledge of bonds within 10 to subtract efficiently. 5 – 3 = 2

Progression in Maths	National Curriculum Expectations - Addition and Subtraction					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Calculation Methods (formal and informal)	add and subtract one-digit and two-digit numbers to 20, including zero	add and subtract numbers using concrete objects, pictorial representations, and mentally, including: * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers	add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) (extend this to decimals)	
Mental Methods			add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds			
Understanding addition and subtraction	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot				
Addition and subtraction facts	represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100				
Problem Solving	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Addition +

Concrete	Pictorial	Abstract
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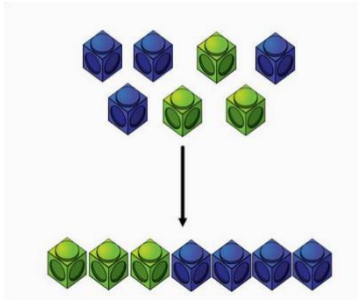
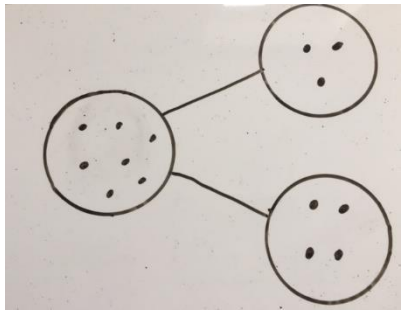
Combining two parts to make a whole

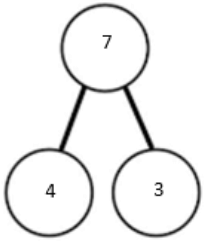
Year 1



Use a range of resources e.g. cars, eggs, shells, teddy bears.

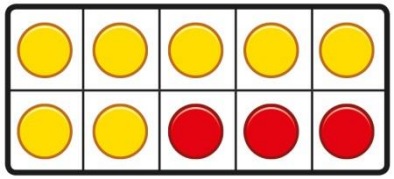


Pupils to represent the cubes using dots or crosses. They could put each part on a part whole model too.



4 + 3 = 7

4 is a part, 3 is a part and the whole is 7.



Counting on

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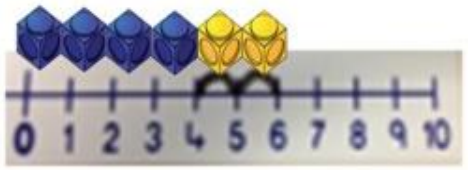
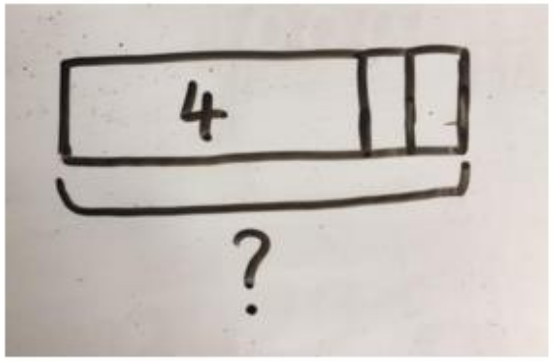
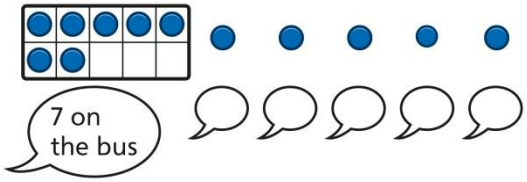
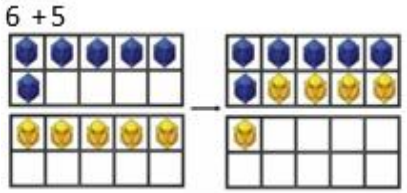
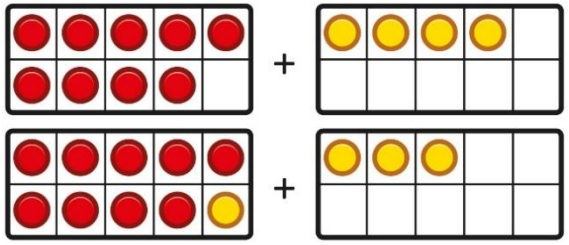
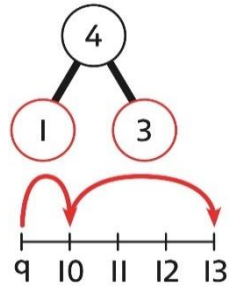
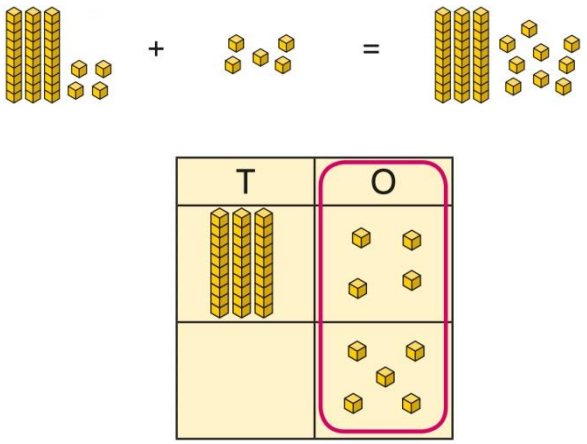
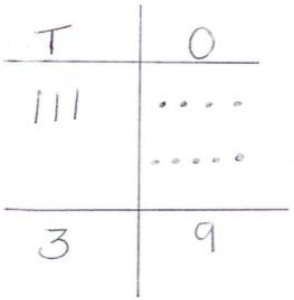
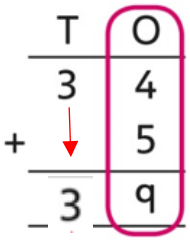
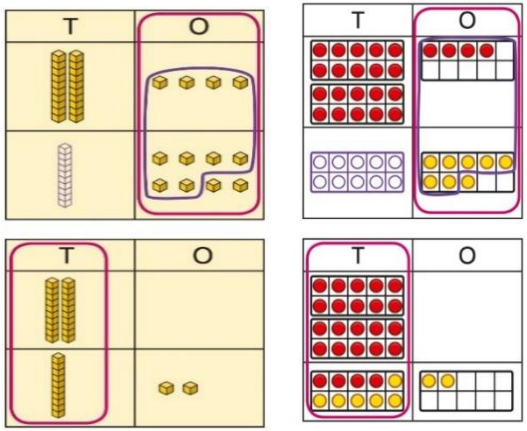
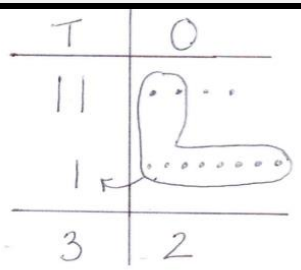
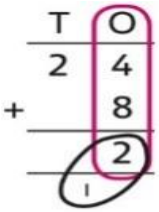
<tr><td rowspan="2">Year 1</td><td> 
</td><td> 

A bar model encourages the pupils to count on rather than count all.</td><td> 

4 + 2
What is 2 more than 4?
What is the sum of 2 and 4?
What is the total of 4 and 2?</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td colspan="4">Bridging 10 using number bonds</td></tr>
<tr><td rowspan="2">Year 1</td><td> 
</td><td>  </td><td> 

9 + 4 = 13
Use a part whole model to support the calculation.</td></tr>
<tr><td> 
7 and 3 makes 10.
So, 7 and 5 is 10 and 2 more.</td><td>Pupils can draw the ten frame and counters.</td></tr>
<tr><td colspan="4">TO + O without exchange</td></tr>
</table>

Year 2	 Continue to develop understanding of partitioning and place value. 34 + 5= 39	 34 + 5= 39 Pupils to represent the base 10 e.g. lines for tens and dot/crosses for ones.	
TO + O with exchange			
Year 2	 24 + 8 = 32	 24 + 8 = 32 Pupils to represent the base 10 in a place value chart, circling when they make an exchange.	 
TO + TO without exchange			

<table>
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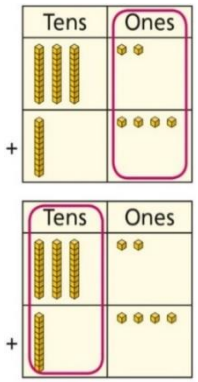
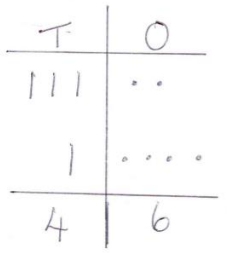
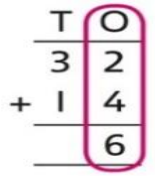
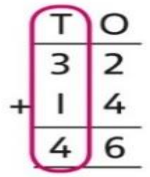
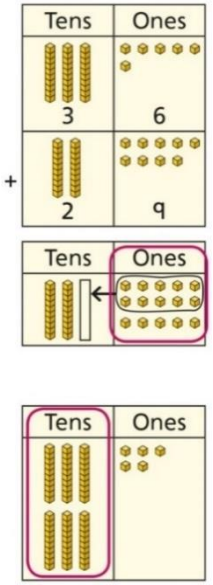
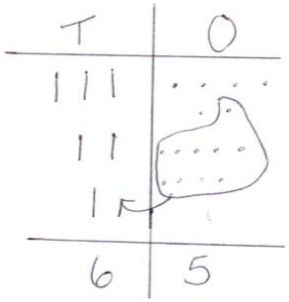
<td>Year 2</td>
<td> 

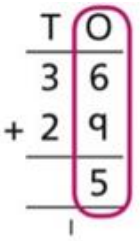
32 + 14 = 46
Add the 1s then add the 10s.</td>
<td> 

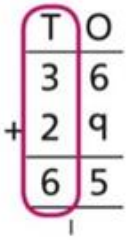
32 + 14 = 46
Pupils to represent the base 10 e.g. lines for tens and dot/crosses for ones.</td>
<td> 



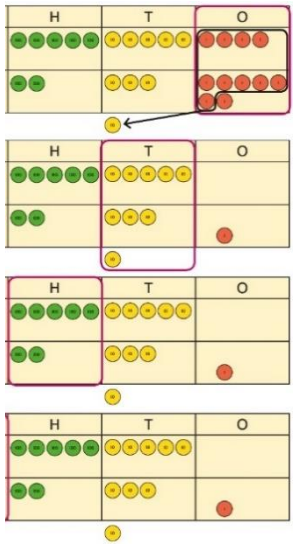
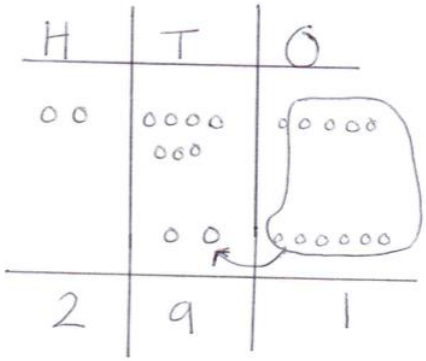
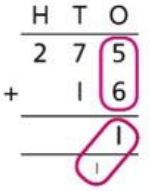
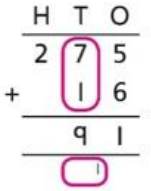
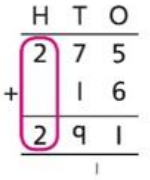
Add the 1s then add the 10s.</td>
</tr>
<tr>
<td colspan="4">TO + TO with exchange</td>
</tr>
<tr>
<td>Year 2</td>
<td> 

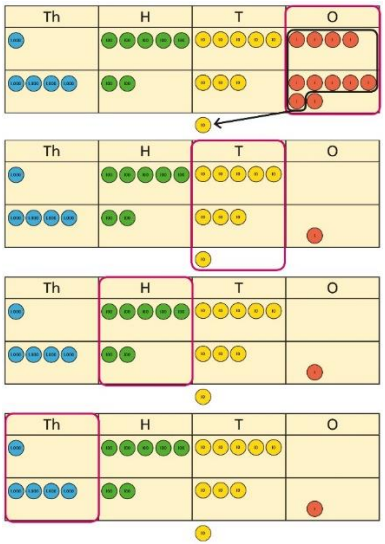
36 + 29 = 65
• Add the 1s.
• Exchange 10 ones for a ten.
• Add the 10s.</td>
<td> 

36 + 29 = 65
Pupils to represent the base 10 in a place value chart, circling when they make an exchange.</td>
<td>Step 1:


Step 2:


• Add the 1s.
• Exchange 10 ones for a ten.
• Add the 10s.</td>
</tr>
<tr>
<td colspan="4">HTO + TO, HTO + HTO (with and without exchange)</td>
</tr>
</table>

Year 3	 554 + 237 = 791 Use of place value counters to add HTO + TO, HTO + HTO etc. • When there are 10 ones in the 1s column- we exchange for 1 ten. • When there are 10 tens in the 10s column- we exchange for 1 hundred. This can be shown practically using dienes or counters where applicable.	 275 + 16 = 291 Pupils to use place value counters in a place value chart, circling when they make an exchange.	Step 1:  Step 2:  Step 3:  *275 + 16 = 291* • Add the 1s. • Exchange 10 ones for a ten. • Add the 10s. • Exchange the 10s for 100 (if needed). • Add the 100s.
ThHTO + ThHTO (with and without exchange)			

<table>
<tr>
<td>Year 4</td>
<td> 

1554 + 4237 = 5791

Use of place value counters to add ThHTO + ThHTO
• When there are 10 ones in the 1s column- we exchange for 1 ten.
• When there are 10 tens in the 10s column- we exchange for 1 hundred.
• When there are 10 hundreds in the 100s column- we exchange for 1 thousand.</td>
<td>Pupils to use place value counters in a place value chart, circling when they make an exchange.

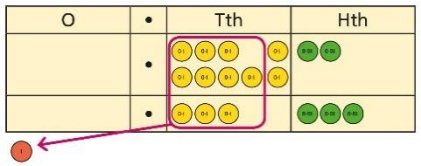
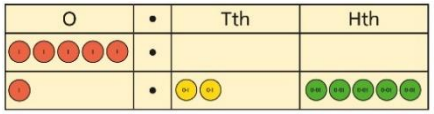
(see above for example)</td>
<td>Step 1:

Step 2:

Step 3:

Step 4:</td>
</tr>
<tr>
<td colspan="4">Addition of more than 4-digit numbers (with and without exchange)</td>
</tr>
<tr>
<td>Years 5 & 6</td>
<td>Use of place value counters to add more than 4-digit numbers</td>
<td>Pupils to use place value counters in a place value chart, circling when they make an exchange.

(see above for example)</td>
<td>TTh Th H T O
1 9 1 7 5
+ 1 8 4 1 7
3 7 5 9 2</td>
</tr>
<tr>
<td colspan="4">Adding decimals</td>
</tr>
</table>

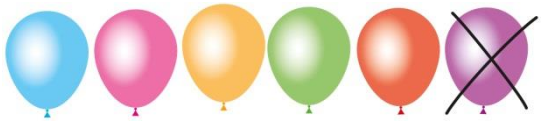
Years 5 & 6	 O · Tth Hth 0 · 9 2 + 0 · 3 3 1 · 2 5 1 Include numbers with differing decimal places  O · Tth Hth 5 · 0 0 + 1 · 2 5 6 · 2 5	Pupils to use place value counters in a place value chart, circling when they make an exchange. (see above for example)	Without exchange O · Tth Hth 0 · 2 3 + 0 · 4 5 0 · 6 8 With exchange O · Tth Hth 0 · 9 2 + 0 · 3 3 1 · 2 5 1 Where numbers of decimal places are different O · Tth Hth 3 · 4 0 + 0 · 6 5 ·

Subtraction -

Concrete	Pictorial	Abstract
➢ These are visual images of the actual resources to use within the classroom. ➢ Use a range of different practical resources. (e.g.base 10, place value counters, straws)	➢ These are pictorial representations that may appear in pupil's work. ➢ These can also be completed practically when needed.	➢ These can be number lines, bar models, Part-part whole, formal methods

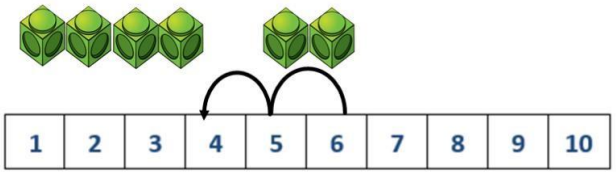
Counting back

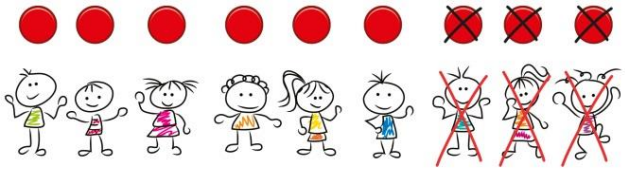
Year 1



Children arrange objects and remove to find how many are left.

1 less than 6 is 5.
6 subtract 1 is 5.



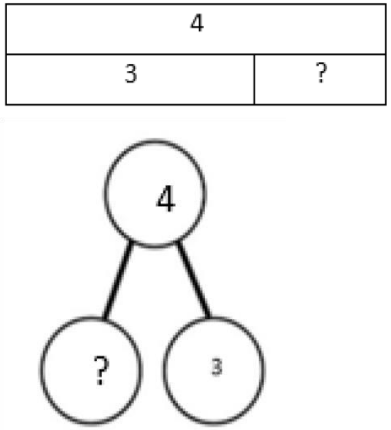


9 – ☐ = ☐

There are ☐ children left.

Pupils draw and cross out or use counters to represent object from a problem.

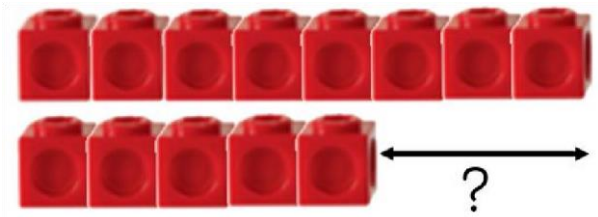
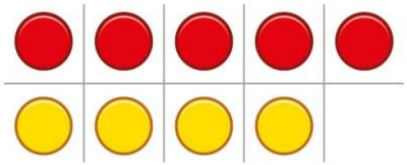
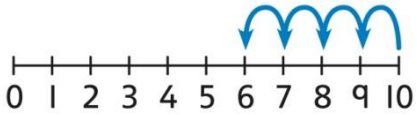
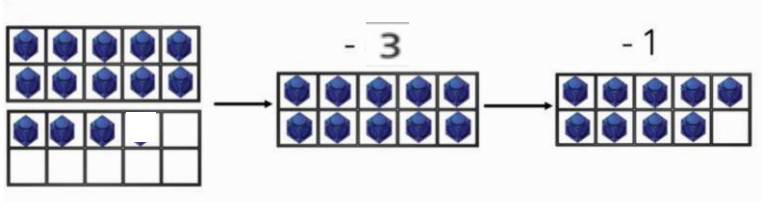
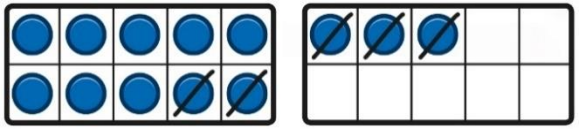
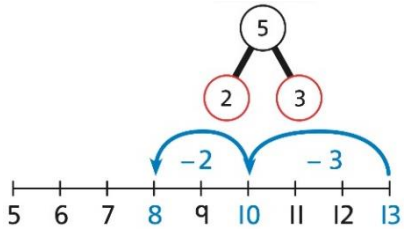
.



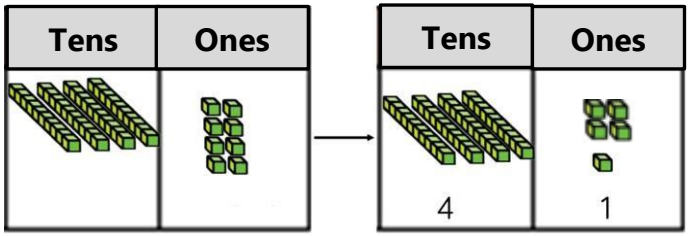
4 – 3= ?

?= 4 – 3

Find the difference

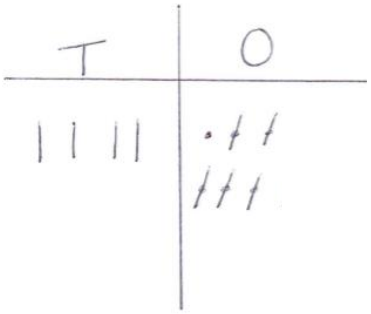
Year 1	 Finding the difference (using cubes / other objects can also be used). Calculate the difference between 8 and 5.	 5 – 4 = 1 The difference between 5 and 4 is 1	 10 – 4 = 6 The difference between 10 and 6 is 4.
Subtracting bridging 10			
Year 1	 13 – 5 =	 For 13 – 5, take away 3 to make 10, then take away 2 to make 8	 13 – 5 =
TO – 0 without exchange			

Year 2



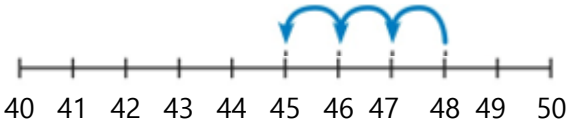
48 – 3 = 45

Practically remove the 7 ones counters



48 – 3 = 45

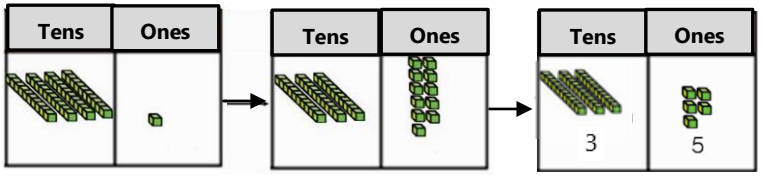
Pupils to represent the base 10 in a place value chart, crossing out the numbers they have taken away.



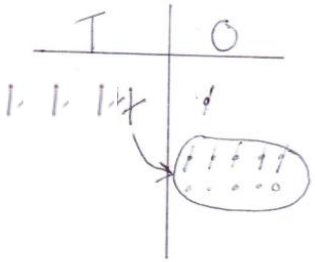
	T	O
	4	8
-	3	
	4	5

TO - O with exchange

Year 2



41 – 6 = 35



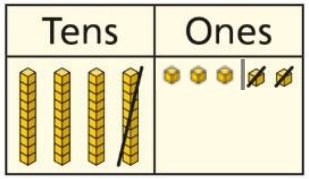
41 – 6 = 35

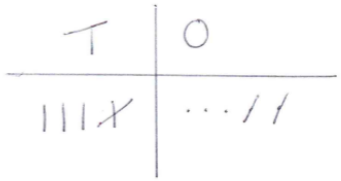
Pupils to represent the base 10 in a place value chart, showing the exchange.

	T	O
	~~3~~4	11
-		6
		5

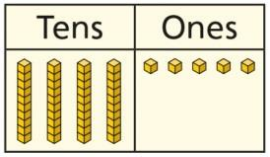
	T	O
	~~3~~4	11
-		6
	1	5

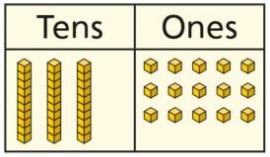
TO – T0 without exchange

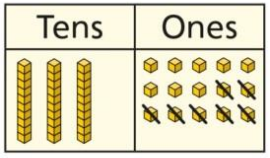
<table>
<tr>
<td>Year 2</td>
<td> 

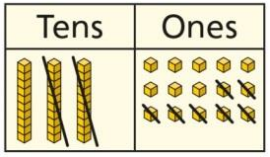
45 – 12 = 33</td>
<td> 

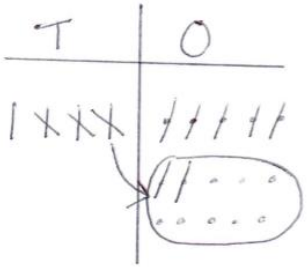
45 – 12 = 33
Pupils to represent the base 10 in a place value chart, crossing out the numbers they have taken away.</td>
<td>T O
4 5
– 1 2
3

T O
4 5
– 1 2
3 3</td>
</tr>
<tr>
<td colspan="4">TO – T0 with exchange</td>
</tr>
<tr>
<td>Year 2</td>
<td>Step 1:
 

Step 2:
 

Step 3:
 

Step 4:
 

45 – 27 = 18</td>
<td> 

45 – 27 = 18

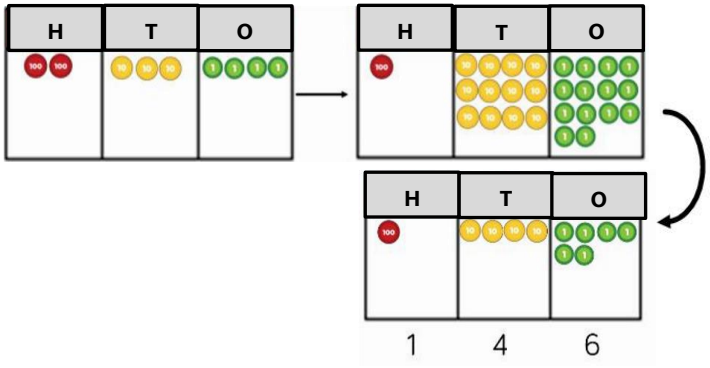
Pupils to represent the base 10 in a place value chart, showing the exchange.</td>
<td>T O
4 5
– 2 7

T O
3 15
– 2 7

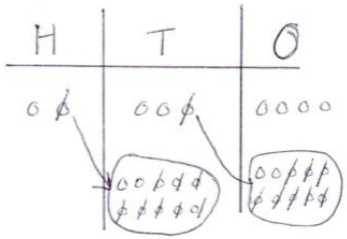
T O
3 15
– 2 7
8

T O
3 15
– 2 7
1 8</td>
</tr>
<tr>
<td colspan="4">HTO - TO, HTO - HTO (with exchange). Pupils will need to recap on ‘without exchange’ first.</td>
</tr>
</table>

Year 3



234 – 88 = 146



234 – 88 = 146

Children to use place value counters in a place value chart showing the exchange.

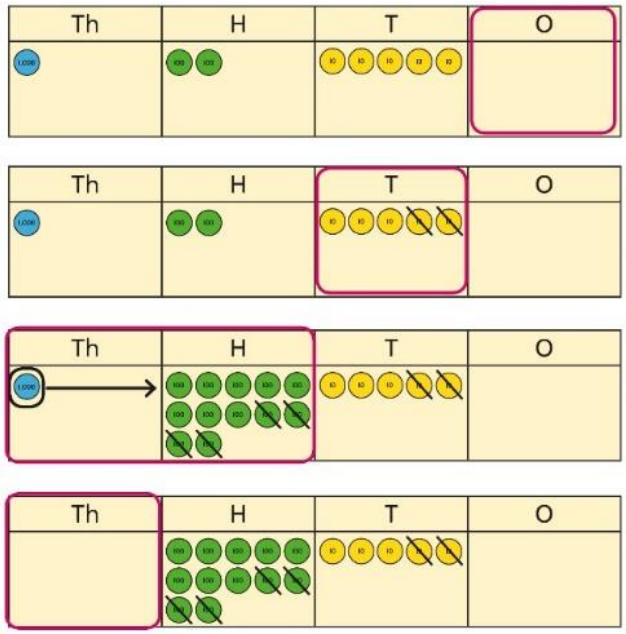
	H	T	O
	~~1~~2	~~12~~3	14
-		8	8
	1	4	6

234 – 88 = 146

- If the subtraction is a 3-digit number subtract a 2-digit number, pupils should understand how to line up the numbers correctly.
- Pupils should also understand how to exchange in calculations where there is a zero in the 10s column.

ThHTO – HTO, ThHTO – ThHTO (with exchange). Pupils will need to recap on 'without exchange' first.

Year 4



1250 – 420 = 830

Children to use place value counters in a place value chart, circling when they make an exchange.

(see above for example)

With one exchange

	Th	H	T	O
	1	2	5	0
–		4	2	0
				0

	Th	H	T	O
	1	2	5	0
–		4	2	0
			3	0

	Th	H	T	O
		¹2	5	0
–		4	2	0
		8	3	0

	Th	H	T	O
		¹2	5	0
–		4	2	0
		8	3	0

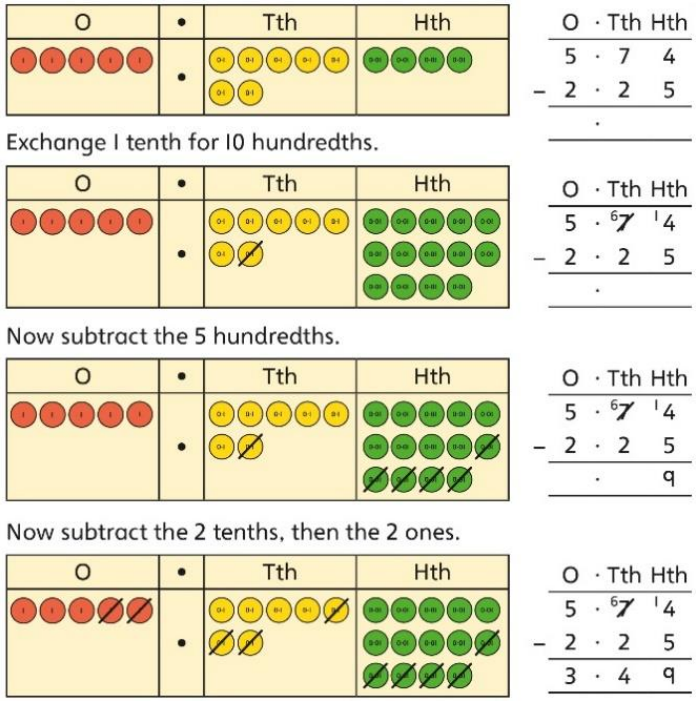
With more than one exchange

	Th	H	T	O
	2	4	¹0	2
–		2	4	3

	Th	H	T	O
	2	4	⁹¹0	¹2
–		2	4	3

	Th	H	T	O
	2	4	⁹¹0	¹2
–		2	4	3
	2	2	5	9

Subtraction of more than 4-digit numbers

Years 5 & 6	Use of place value counters to subtract more than 4-digit numbers	Children to use place value counters in a place value chart, circling when they make an exchange. (see above for example)	TTh Th H T O 5 11 1 6 2 0 9 7 – 1 8 5 3 4 4 3 5 6 3 • Pupils to subtract numbers of different sizes.
Subtracting decimals			
Years 5 & 6	 O · Tth Hth 5 · 7 4 – 2 · 2 5 5 · 6 1 4 3 · 4 9	Children to use place value counters in a place value chart, circling when they make an exchange. (see above for example)	O · Tth Hth 5 · 6 1 4 – 2 · 2 5 3 · 4 9 • Pupils subtract numbers with different number of decimal places. 3.921 – 3.75 O · Tth Hth Thth 3 · 9 2 1 – 3 · 7 5 0 • Ensure pupils are confident with subtracting decimal numbers from whole numbers. 14 -5.2 =