



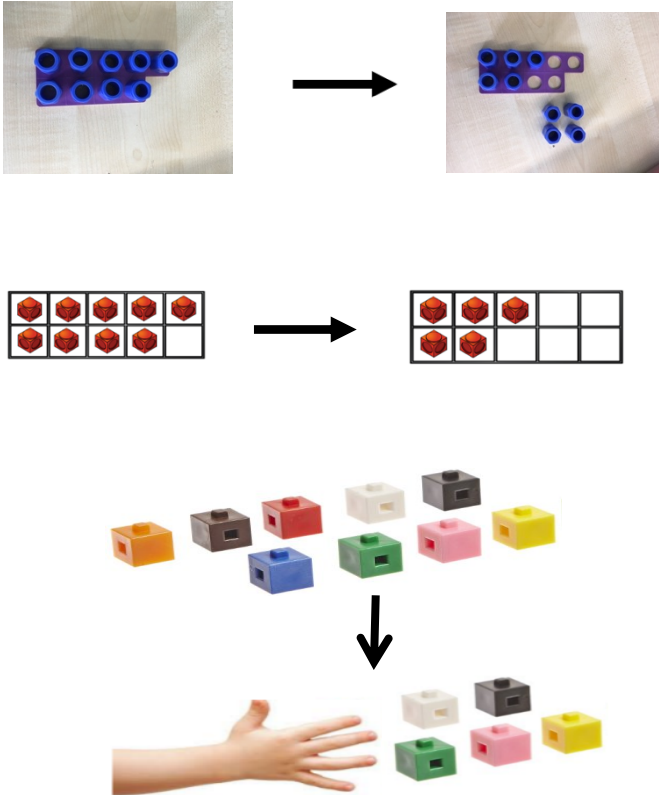
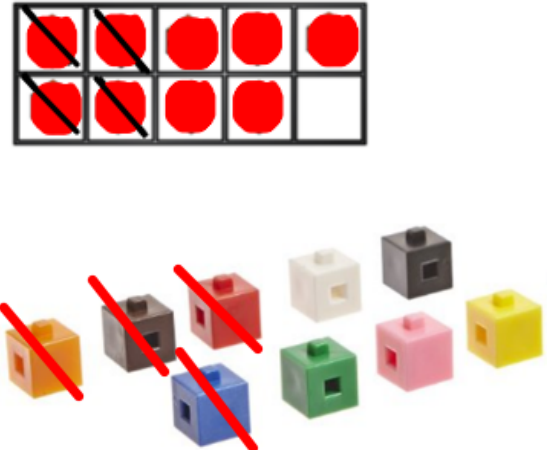
Northway Primary School
Mathematics Calculation Policy - Subtraction

The **Concrete Pictorial Abstract (CPA)** approach is a system of learning that uses physical and visual aids to build a child's understanding of abstract topics.

- **Concrete:** New concepts are introduced through the use of physical objects or practical equipment e.g. Numicon or Base 10. These can be physically handled, enabling children to explore different mathematical concepts.
- **Pictorial:** Once children are confident with a concept using concrete resources, they progress to drawing pictorial representations of the objects. This stage encourages children to make a mental connection between the physical object and abstract levels.
- **Abstract:** Once children have a secure understanding of the concept through the use of concrete resources and visual images, they are then able to move on to the abstract stage. Here, children are using abstract symbols to model problems - usually numerals. To be able to access this stage effectively, children need access to the previous two stages alongside it.

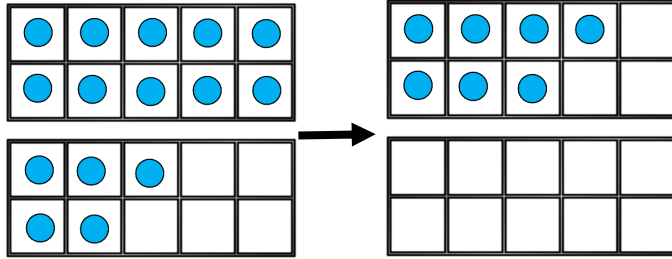
For the most effective learning to take place, children need to constantly go back and forth between each of the stages. This ensures concepts are reinforced and understood.

Children should be using concrete resources when covering place value objectives in Maths lessons and making numbers with these so that they learn the value of each concrete resource. This will then support them when using the same concrete resources for addition and subtraction methods (see below).

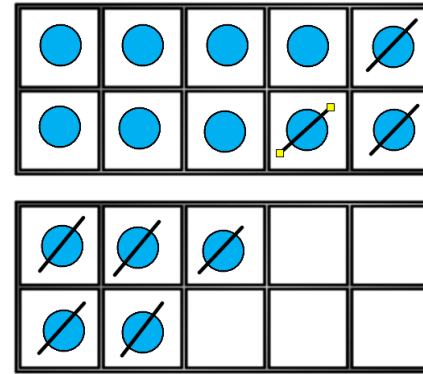
Year group	<p>NC Objective</p> <p>Pupils should be taught to:</p>	Concrete	Pictorial	Abstract
Reception	<p><u>Development Matters:</u></p> <p>Explore the composition of numbers to 10.</p> <p>Automatically recall number bonds for numbers from 0-10.</p>	 <p>The concrete stage shows two rows of objects. The top row starts with a blue rod of length 9, which is then broken into a rod of length 5 and a separate rod of length 4. The bottom row shows a ten-frame with 9 red cubes (5 in the first row, 4 in the second) and 4 more red cubes below it. An arrow points to a ten-frame with 5 red cubes (2 in the first row, 3 in the second) and 4 empty spaces. The bottom part shows 9 multi-colored blocks (orange, grey, red, white, black, blue, green, pink, yellow) with an arrow pointing to a hand holding 5 blocks (white, grey, green, pink, yellow).</p>	 <p>The pictorial stage shows a ten-frame with 9 red circles (5 in the first row, 4 in the second) and 4 more red circles below it. An arrow points to a ten-frame with 5 red circles (2 in the first row, 3 in the second) and 4 empty spaces. The bottom part shows 9 multi-colored blocks (orange, grey, red, white, black, blue, green, pink, yellow) with 4 blocks (orange, grey, red, blue) crossed out with red diagonal lines, leaving 5 blocks (white, black, green, pink, yellow).</p>	$9 - 4 = 5$

Y1

Subtract one-digit and two-digit numbers to 20, including zero.



Children will count out 15 counters. They will place 10 counters into the first tens frame, putting them in using a pairs system, then an extra 5 counters into the second tens frame. They will physically take 8 counters away, making sure they start with taking away the 5 counters in the second tens frame first then removing 3 more counters from the end of the first (full) tens frame.



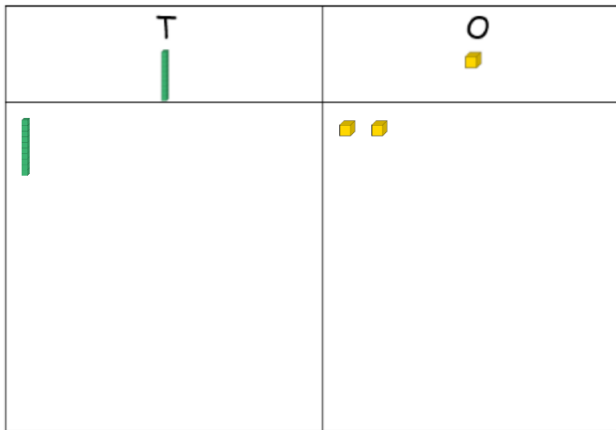
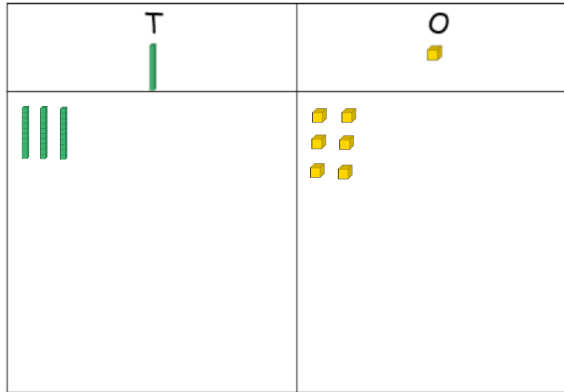
For the pictorial representation, children can use printed tens frames and draw 15 dots. They will cross out 8 of these to show they are taking them away, making sure they start with crossing out the 5 dots in the second tens frame then crossing out 3 more dots from the end of the first (full) tens frame.

$$15 - 8 = 7$$

Y2

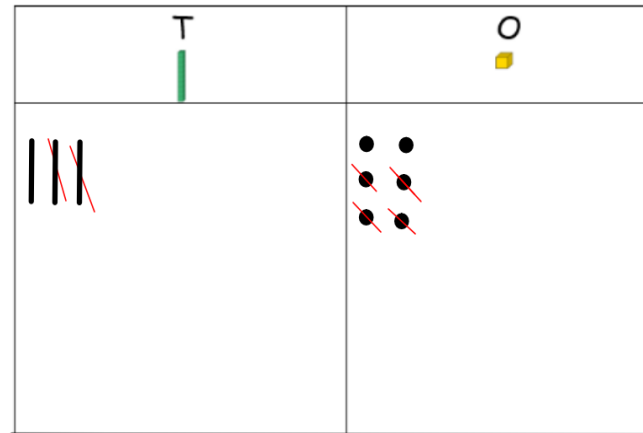
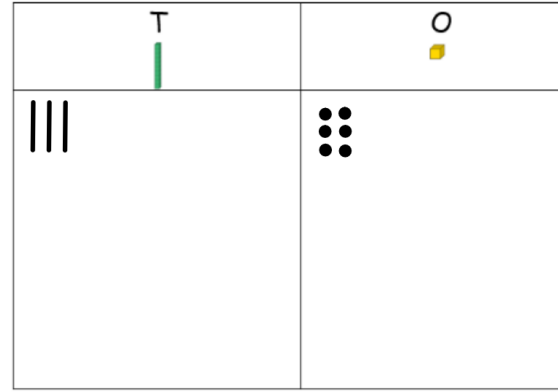
Subtract numbers using concrete objects, pictorial representations and mentally, including: two two-digit numbers.

Step 1 (no regrouping):



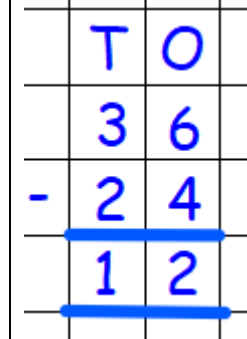
The four 'ones' and the two 'tens' can physically be taken away from the calculation mat to leave the answer. When children are ready, they can record numerals for their answer.

Step 1 (no regrouping):

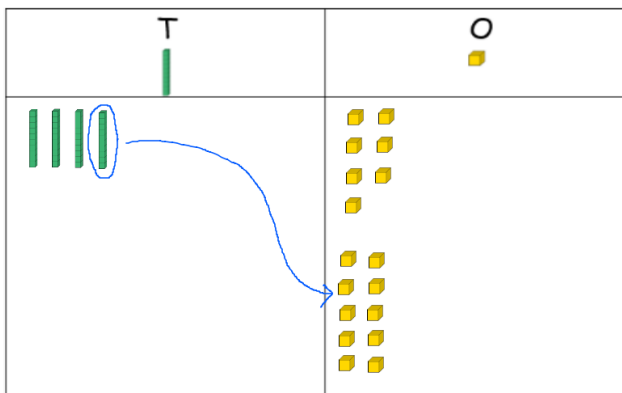
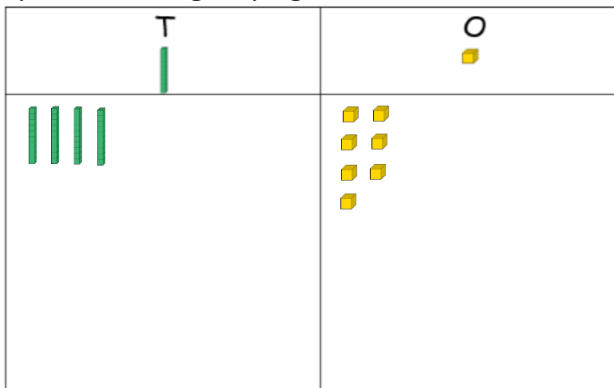


The four 'ones' and the two 'tens' can be crossed out in pictorial method to represent the fact they have been taken away. The 'ones' and 'tens' left on the calculation mat show the answer. When children are ready, they can record numerals for their answer.

Step 1 (no regrouping):



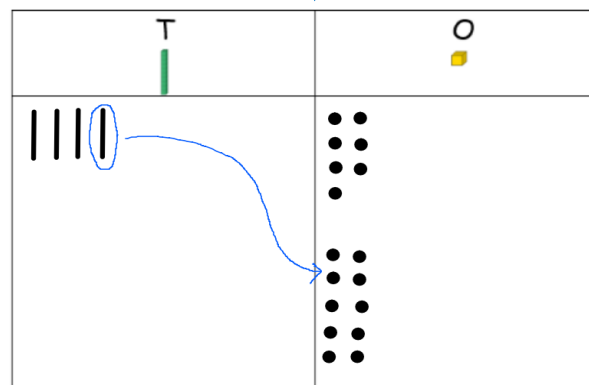
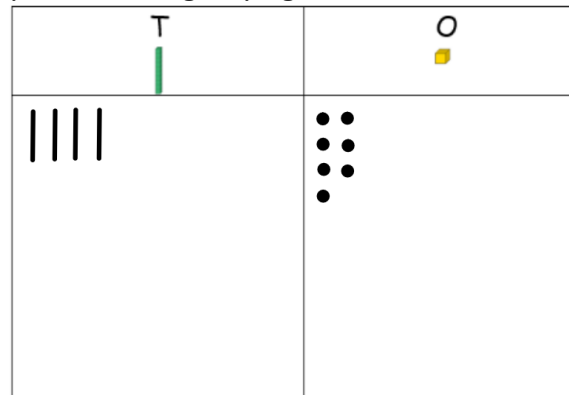
Step 2 (with regrouping):



Because we cannot subtract 9 'ones' from the 7 'ones' in the calculation, we need to regroup one 'ten' for ten 'ones'. This can be seen above with the circle drawn around the 'ten' and the arrow representing the fact it has been regrouped for ten 'ones' in the 'ones' column.



Step 2 (with regrouping):

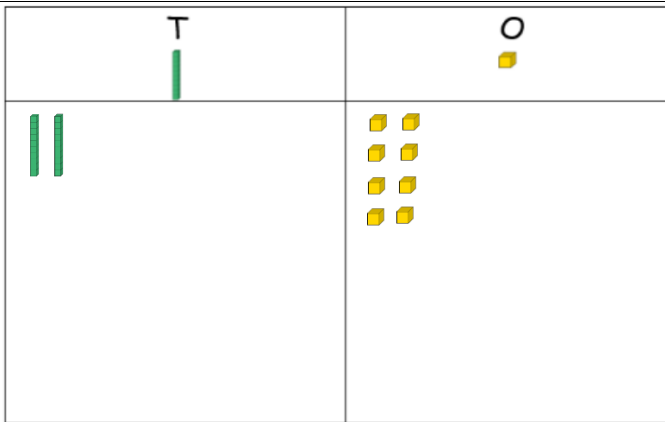


Because we cannot subtract 9 'ones' from the 7 'ones' in the calculation, we need to regroup one 'ten' for ten 'ones'. This can be seen above with the circle drawn around the 'ten' and the arrow representing the fact it has been regrouped for ten 'ones' in the 'ones' column.

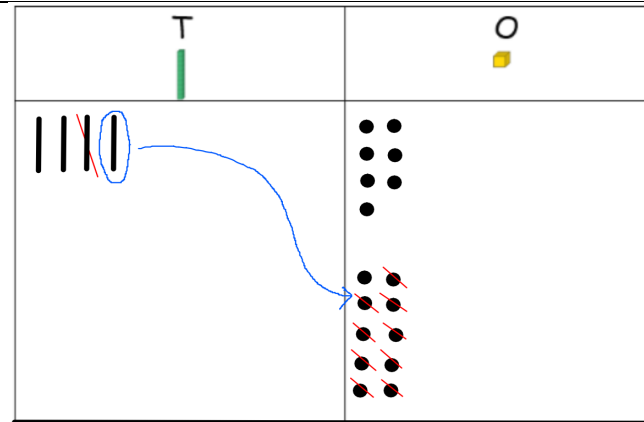


Step 2 (with regrouping):

	T	O	
	3 4	1 7	
-	1	9	
	2	8	

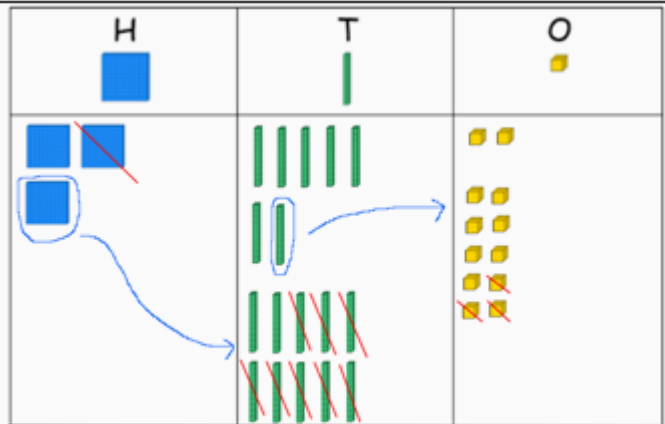


Now, nine 'ones' and two 'tens' can physically be taken away from the calculation mat to leave the answer. When children are ready, they can record numerals for their answer.

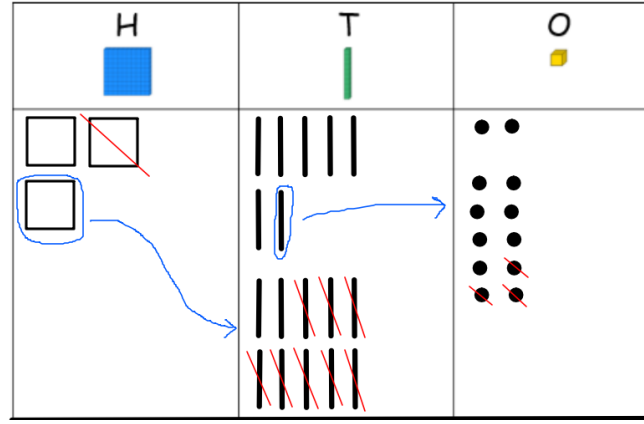


Now, nine 'ones' and one 'ten' can be crossed out in pictorial method to represent the fact they have been taken away. The 'ones' and 'tens' left on the calculation mat show the answer. When children are ready, they can record numerals for their answer.

Y3 Subtract numbers with up to three digits, using formal written methods of columnar addition.



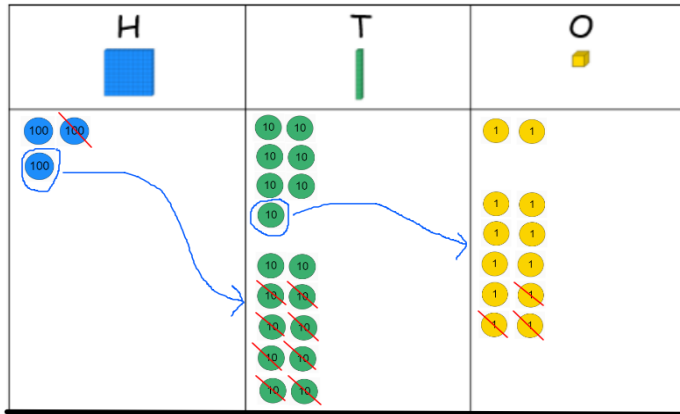
The circles and arrows represent regroupings. The red lines represent the taking away of the concrete resources. When children are ready, they can record numerals for their answer.



The circles and arrows represent regroupings. The red lines represent taking away. When children are ready, they can record numerals for their answer.

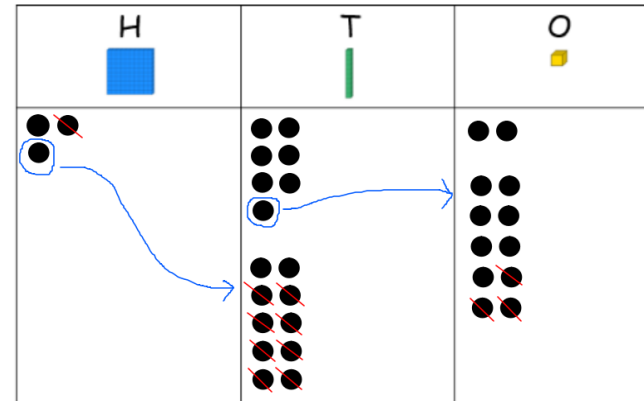
	H	T	O
	² 3	¹⁶ 7	¹ 2
-	1	8	3
	1	8	9

This same calculation could also be represented using place value counters as the concrete resource.



The circles and arrows represent regroupings. The red lines represent the taking away of the concrete resources. When children are ready, they can record numerals for their answer.

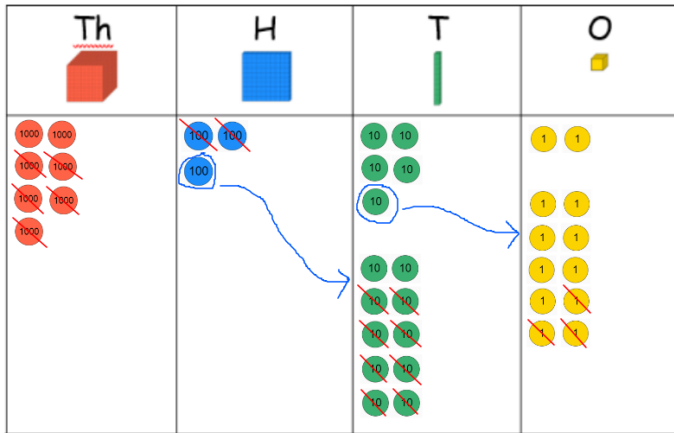
This same calculation could also be represented using pictorial representation of the place value counters.



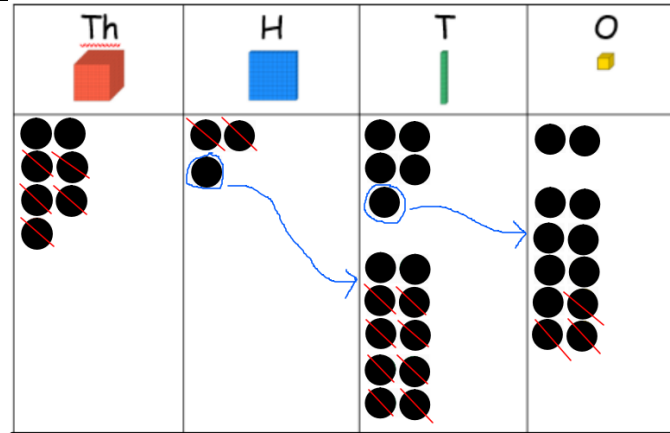
The circles and arrows represent regroupings. The red lines represent taking away. When children are ready, they can record numerals for their answer.

Y4

Subtract numbers with up to 4 digits using the formal written methods of columnar addition.



The circles and arrows represent regroupings. The red lines represent the taking away of the concrete resources.



The circles and arrows represent regroupings. The red lines represent taking away.

	Th	H	T	O
	7	² 3	¹⁴ 5	¹ 2
-	5	2	8	3
	<hr/>			
	2	0	6	9
	<hr/>			

Examples should also include numbers that involve regrouping across two place value columns e.g.

	Th	H	T	O
	9	⁶ 7	⁹ 0	¹ 4
-	2	5	3	8
	<hr/>			
	7	1	6	6
	<hr/>			

Y6

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

	H	T	T	T	H	T	O
	6 7	10 1	1 3	5 6	13 4	1 2	
-	1	3	9	4	7	3	
	5	7	4	1	6	9	

	H	T	O	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	
	2 3	1 5	7	4 2	5	1 0	
-		9	4	1	0	8	
	2	6	3	1	4	2	