Gillibrand Primary School

Maths Calculation Policy - Subtraction

Written September 2018

By Mrs H Clark

Deputy Head and Maths Subject Lead

At Gillibrand, we use the ‘concrete, pictorial, abstract’ approach to ensure all pupils develop a deep understanding of maths that is essential for developing mastery in mathematics. As such, our calculation policy is based on this approach whilst ensuring progression and continuity in mathematical calculation across school.

The Concrete Step:

The concrete stage is the physical doing stage. During this stage pupils use concrete objects. In this way bringing mathematical learning to life

The Pictorial Step:

The pictorial stage is the ‘seeing’ stage. Visual representations of concrete objects are used to support leaning. This supports children making a mental connection between the physical object and the pictures, diagrams or models.

The Abstract Step:

Abstract is the ‘symbolic stage’, where children use only numbers, notation and mathematical symbols to indicate addition, subtraction and multiplication.

Reasoning and Problem Solving:

Once children are fluent in the calculation strategy for their year group, we deepen and embed understanding through providing children with a range of reasoning and problem solving skills that allow the children to show their full understanding in a range of different contexts.

Although our policy is set out based on The National Curriculum year group expectations, children work through the calculation policy systematically. Some children may therefore be working below year group expectation and should be taught the method appropriate for their individual stage in learning.

Calculation Policy: Subtraction

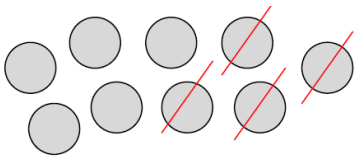
Key Vocabulary: take-away, subtract, minus, fewer, less, difference

EYFS - ***Using quantities and objects, children subtract two single-digit numbers and count on or back to find the answer.***

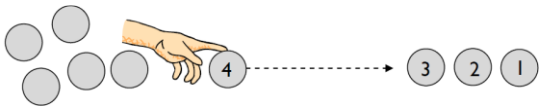
Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of practical equipment, including small world play, role play, counters, cubes etc.

Taking away

Children will begin to develop their ability to subtract by using practical equipment to count out the first number and then remove or take away the second number to find the solution by counting how many are left e.g. 9 – 4.



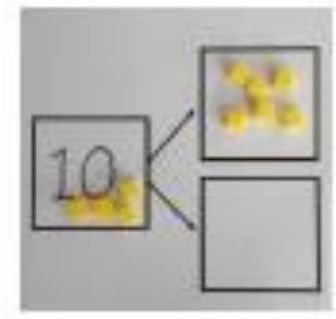
For illustration purposes, the amount being taken away are show crossed out. Children would be encouraged to physically remove these using touch counting.



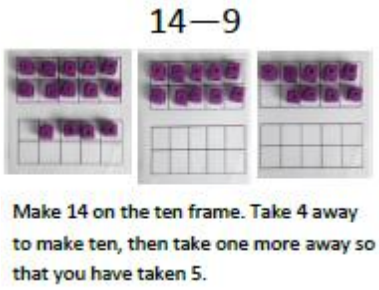
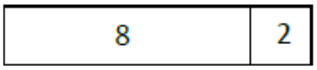
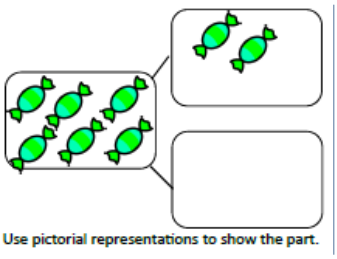
By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch count the amount that are left to find the answer.

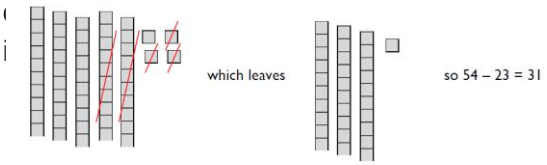
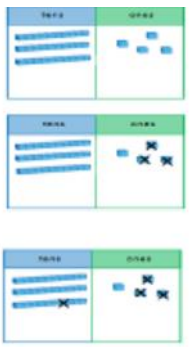
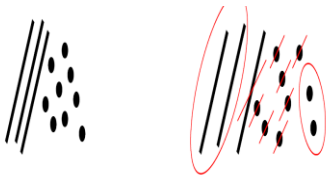
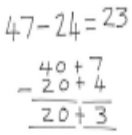
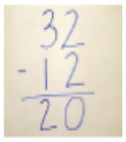
Those who are ready may record their own calculations.

During whole class teaching children are also introduced to the visual representations of both the place value grid, the bar model and a part whole model. The children are not expected to use these independently but are introduced to them in preparation for Year 1 and beyond



Year 1 - Subtract one digit and 2 digit numbers up to 20. (using objects and pictures) including 0.

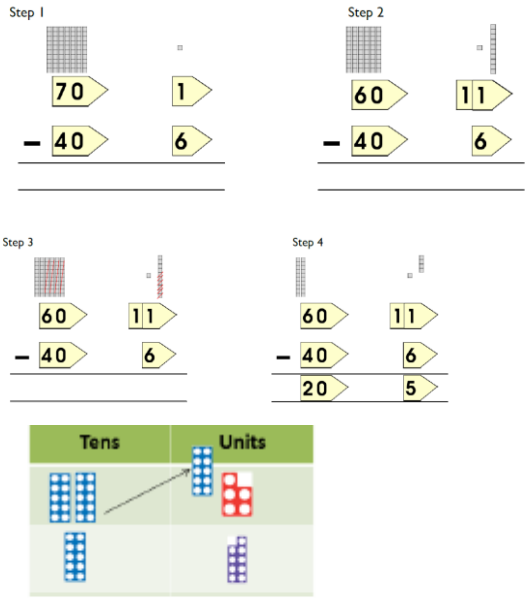
Concrete	Pictorial	Abstract
Children will continue to use practical equipment and taking away strategies. To avoid the need to exchange for subtraction at this stage, we continue to use equipment such as counters, cubes and the units from the Base 10 equipment, but not the tens, e.g. 13 – 4 Touch count and remove the number to be taken away, in this case 4. Touch count to find the number that remains.  Make 14 on the ten frame. Take 4 away to make ten, then take one more away so that you have taken 5.	Children will use images of the concrete objects explored practically as well as the bar model to show the calculations, including missing numbers, and the part whole model.  10 = 8 + 2 10 = 2 + 8 10—2 = 8 10—8 = 2  Use pictorial representations to show the part.	Children will use their knowledge of number to calculate and record written calculation e.g. 12 - 5= 7 Children should be taught that the = sign does not always come at the end of the calculation. 18 = 19 -1

Year 2 - Subtract a one digit number from a two-digit number and a two digit number from a two-digit number (including mentally).		
Concrete	**Pictorial**	**Abstract**
Children will begin to use the Base 10 equipment to support their calculations, still using a take away, or removal, method. They need to understand that the number being subtracted does not appear as an amount on its own, but rather as part of the larger amount. For example, to calculate 54 - 23, children would count out 54 using the Base 10 equipment (5 tens and 4 units). They need to consider whether there are enough units/ones to remove 3, in this case there are, so they would remove 3 units and then two tens, counting up the answer of 3 tens and 1 unit to give 31. When the amount of units to be subtracted is greater than the units in the original number, an exchange method is required. This relies on children's understanding of ten units being an equivalent amount to one ten. To calculate 53 – 26, by using practical equipment, they would count out 53 using the tens and units, as in Step 1. They need to consider whether there are enough units/ones to remove 6. In this case there are not so they need to exchange a ten into ten  34—13 = 21  Use Dienes to show how to partition the number when subtracting without regrouping.	Children use pictorial representations including drawings and images of physical apparatus, as well as the bar model, part whole model and number lines. Children can record their drawings of Base 10 using slanted lines for the rods and dots for the ones blocks. Circling the tens and units that remain will help children to identify how many remain. 	A small number of children may ready for the abstract approach as taught in Year 3.  Intermediate step may be needed to lead to clear subtraction understanding. 

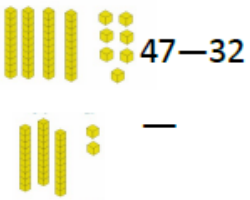
Year 3 - Subtract numbers with up to 3-digits, using the column method.

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*
It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

Concrete	Pictorial	Abstract
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to represent the first number, removing the units and tens as appropriate (as with the more informal method in Y2).	Children can also use jottings of the Base 10 materials (as in Year 2) to support with their calculation, as in the example below.	By the end of year 3, children should also extend this method for three digit numbers.



Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into tten ones. Use the phrase 'take and make' for exchange.

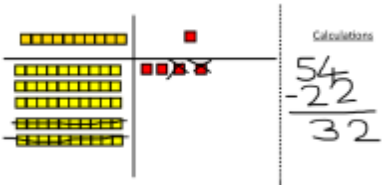


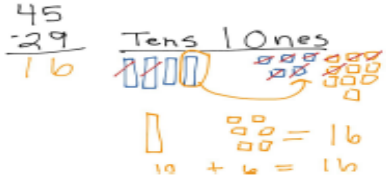
Use base 10 or Numicon to model

80 → 9
- 50 → 7
30 → 2 = 32

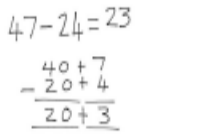
Children need to consider whether there are enough units/ones to remove 6. In this case there are not (Step 1) so they need to exchange a ten into ten ones to make sure that there are enough, as they have been doing in the method for Year 2 (Step 2). They should be able to see that the number is just partitioned in a different way, but the amount remains the same (71 = 70 + 1 = 60 + 11).

60
~~70~~ → 11
- 40 → 6
20 → 5 = 25

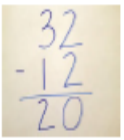




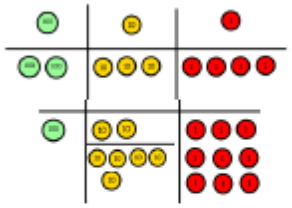
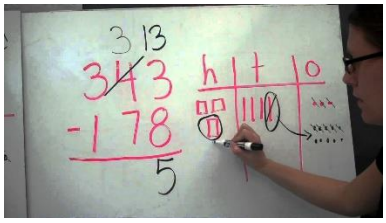
Children may draw base ten or PV counters and cross off.

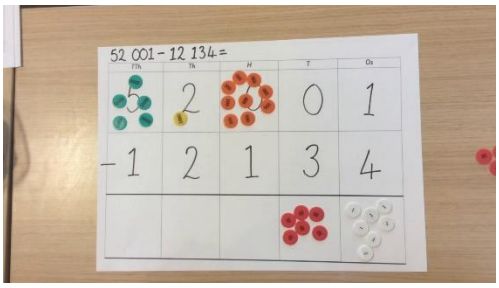
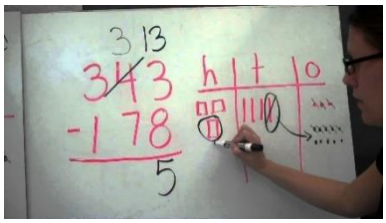


Intermediate step may be needed to lead to clear subtraction understanding.



Year 4 - Subtract up to 4-digits using the column method and to one decimal place.

Concrete	Pictorial	Abstract
234 - 179  Model process of exchange using Numicon, base ten and then move to PV counters.	Children use pictorial representations including drawings and images of physical apparatus, as well as the bar model, part whole model and number lines.  As in previous year groups, children can record their drawings of Base 10 using squares for the 100s block, slanted lines for the rods and dots for the ones blocks. 	600 140 ~~700~~ → ~~50~~ → ¹4 - 200 → 80 → 6 400 → 60 → 8 = 468 6 14 4 ~~7~~ ~~5~~ ¹4 - 3 2 8 6 1 4 6 8 By the end of Y4, children should be using the written method confidently and with understanding. They will also be subtracting: - numbers with different numbers of digits, understanding the place value; - - decimals with one decimal place, knowing that the decimal points line up under one another.

Year 5 and 6 - Subtract whole numbers with more than 4 digits using formal written methods, as well as mixed decimals		
Concrete	**Pictorial**	**Abstract**
At this stage most children working at the expected standard will not need to explore concrete resources for the subtraction of whole numbers as this will have been secured in previous year groups. However, they should be given, planned purposeful opportunities to use counters and Numicon to explore addition of decimals Children should extend the decomposition method and use it to subtract whole numbers and decimals with any number of digits. They will also be subtracting: - numbers with different numbers of digits, understanding the place value; - decimals with up to two decimal places (with mixed numbers of decimal places), knowing that the decimal points line up under one another. - amounts of money and measures, including those where they have to initially convert from one unit to another.  	Children can draw visual representations of place value counters to support the transition from concrete to abstract. As in previous year groups, children can record their drawings of Base 10 using squares for the 100s block, slanted lines for the rods and dots for the ones blocks.   	Children should be given opportunities to add: • several numbers with different numbers of digits, understanding the place value; • decimals with up to two decimal places (with mixed numbers of decimal places), knowing that the decimal points line up under one another. • amounts of money and measures, including those where they have to initially convert from one unit to another.