Gillibrand Primary School

Maths Calculation Policy - Addition

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Aims

At Gillibrand, we aim to deliver high standards in the teaching and learning of the Mathematics curriculum from Foundation Stage to the end of Key Stage 2.

We believe that all children require a solid understanding of place value and the number system, which, together with the knowledge and recall of number facts and mental strategies, act as the foundation for mathematical development.

Calculation strategy development is vital to our teaching and learning strategy, being viewed as the tools for our children's future successes in applied application.

In order to ensure a deep understanding of number and calculation, 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 context.

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.

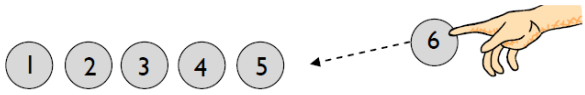
EYFS - Using quantities and objects, children add two single-digit numbers and count on to find the answer.

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.

Counting all method

Children will begin to develop their ability to add by using practical equipment to count out the correct amount for each number in the calculation and then combine them to find the total. For example, when calculating 4 + 2, they are encouraged to count out four counters and count out two counters.

To find how many altogether, touch and drag them into a line one at a time whilst counting.

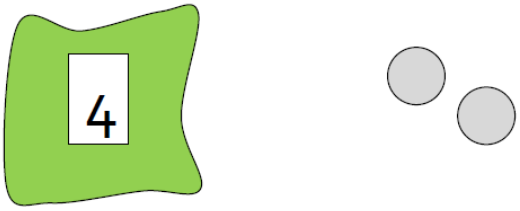


By touch counting and dragging in this way, it allows children to keep track of what they have already counted to ensure they don't count the same item twice?

Counting on method

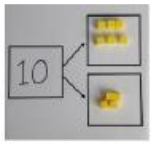
To support children in moving from a counting all strategy to one involving counting on, children should still have two groups of objects but one should be covered so that it cannot be counted. For example, when calculating 4 + 2, count out the two groups of counters as before.

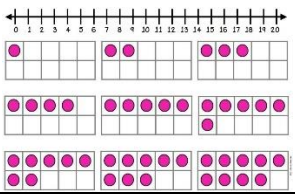
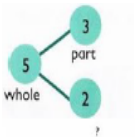
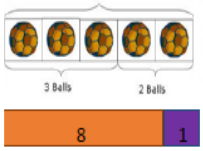
Then cover up the larger group with a cloth.
For example:

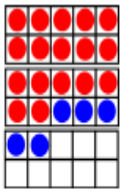
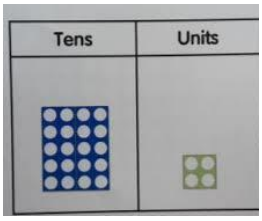
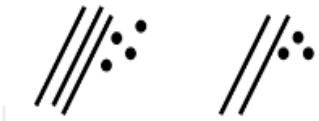
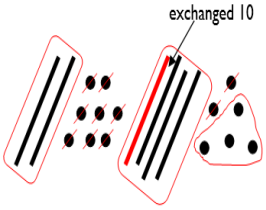
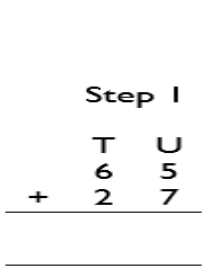


For most children, it is beneficial to place the digit card on top of the cloth to remind the children of the number of counters underneath. They can then start their count at 4, and touch count 5 and 6 in the same way as before, rather than having to count all of the counters separately as before. **Those 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.



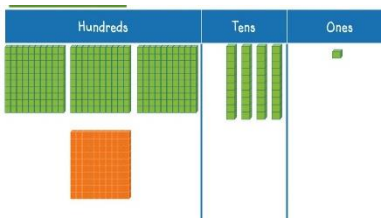
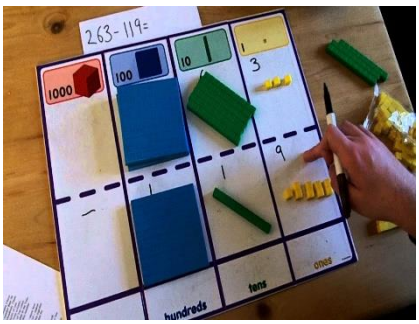
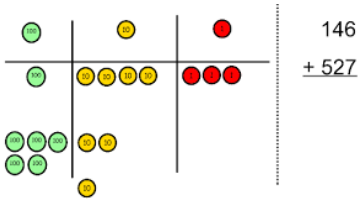
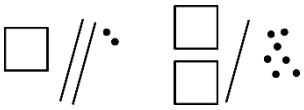
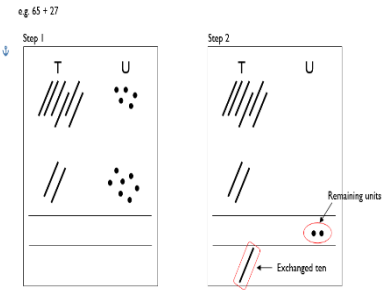
Year 1 - Add one digit and 2 digit numbers up to 20 (using objects and pictures) including 0		
Concrete	**Pictorial**	**Abstract**
Children will continue to use practical equipment, combining groups of objects to find the total by counting all or counting on.  Children explore ways of making numbers within 20     Using their developing understanding of place value, they will move on to be able to use Base 10 and Numicon equipment to make teens numbers using separate tens and ones. For example, when adding 11 and 5, they can make the 11 using a ten rod and a unit. So 11 + 5 = 16. If possible, they should use two different colours of base 10 equipment so that the initial amounts can still be seen.  A tens frame can also be used: 	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.    Use pictures to add two numbers together as a group or in a bar.	Children will use their knowledge of number to calculate and record written calculation e.g. 12 + 6 = 18 Children should be taught that the = sign does not always come at the end of the calculation. 20 = 19 + 1 8 + 12= 20

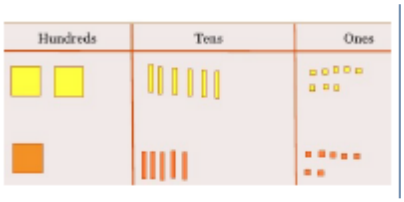
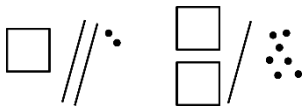
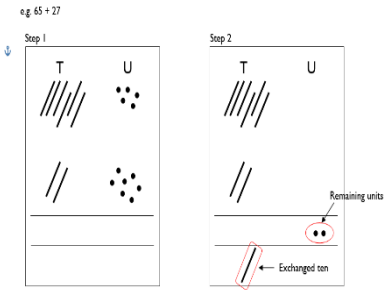
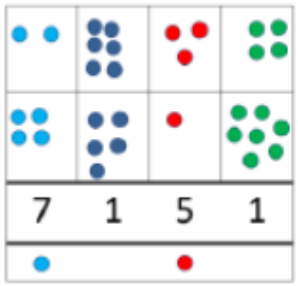
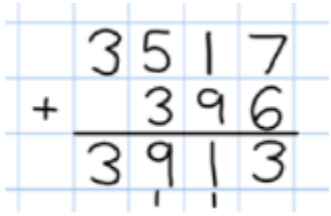
Year 2 - Add a two-digit number and ones and a two-digit number and tens (including mentally)		
Concrete	**Pictorial**	**Abstract**
Continue to use practical equipment including counters and tens frames, multi-link cubes, Base 10 apparatus, straws, bead strings and Numicon etc. to show how to add the numbers e.g.  17 + 5 = 22 Use ten frame to make 'magic ten Children explore the pattern. 17 + 5 = 22 27 + 5 = 32 Children can use a place value grid to combine add the physical apparatus in various forms:  	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.  With exchange: e.g. 28 + 36 =   	Children will begin to use the formal colum method. Intitially without crossing through a tens then progressing to crossing through a tens by carrying.  27 + 10 = 37 27 + 20 = 47 27 + □ = 57

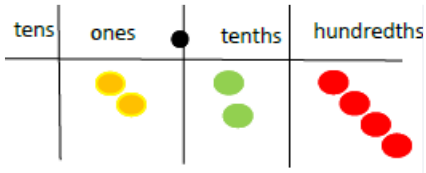
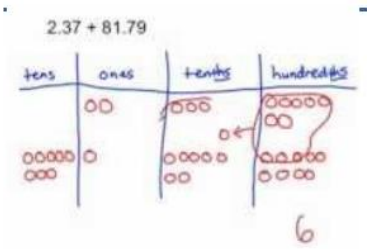
Year 3 - Add numbers with up to 3-digits, using the column method.

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. Children should add the **least significant digits** first (i.e. start with the ones), and in an identical method to that from year 2, should identify whether there are greater than ten units which can be exchanged for one ten. (As in Step 1 in the diagram below).e.g. 65 + 27 356 + 152 – Children use Base 10, Numicon and counters to explore adding numbers by carrying  	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 squares for the 100s block, slanted lines for the rods and dots for the ones blocks.  	They can use a place value grid to begin to set the calculation out vertically and to support their knowledge of exchange between columns 2 2 3 + 1 1 4 3 3 7 Add the ones first, then the tens, then the hundreds.

Year 4 - Add up to 4-digits using the column method.		
Concrete	**Pictorial**	**Abstract**
Children continue to use Base 10 and counters to add, exchanging 10 ones for a ten and ten tens for 100 and ten 100's for 1000. 	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.   	

Year 5 and 6 - Add and subtract whole numbers with more than 4 digits using formal written methods as well as decimals.		
Concrete	**Pictorial**	**Abstract**
Children working at a Year 5/6 level should be secure in the use of column and will not need to use Base 10 as in previous years as their understanding of the concept will be secure. However, they should be given, planned purposeful opportunities to use counters and Numicon to explore addition of decimals.  	Children can draw visual representations of place value counters to support the transition from concrete to abstract.  	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.