# Maths Calculations and Representations Policy

## Guidance

A high-quality mathematics education provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics and a sense of enjoyment and curiosity about the subject. Mastery is for all, and the aim of this policy is to ensure all pupils leave our schools with a secure understanding of the four operations and the ability to confidently use both written and mental calculation strategies in a range of contexts. This policy aims to ensure consistent strategies, models and representations are used across the primary age range to embed and deepen pupils' learning and understanding of mathematical concepts.

This policy sets out the progression of procedures, strategies and written methods which pupils will be taught as they develop in their understanding of the four operations, with both integers and parts of numbers. Strategies are set out in a Concrete, Pictorial, Abstract (CPA) approach to develop pupils' deep understanding and mastery of mathematical concepts. Pupils use concrete objects to help them make sense of the concept or problem; this could be anything from real or plastic fruit, to straws, counters or cubes. This is then developed through the use of images, models and pupils' own pictorial representations before moving on to the abstract mathematics. Pupils will travel along this continuum again and again, often revisiting previous stages when a concept is extended. It is also worth noting that if a child has moved on from the concrete to the pictorial, it does not mean that the concrete cannot be used alongside the pictorial or the abstract. Similarly, although these strategies are taught in a progressive sequence, they are designed to equip pupils with a mathematical 'tool box' that they can apply to solve problems in a range of contexts. As a new strategy is taught, it builds on prior learning to enable pupils to have a variety of tools to select from.

As pupils become increasingly independent, they will be able to and must be encouraged to select those strategies which are most efficient for the task. Pupils should be moved through the strategies at a pace appropriate to their age-related expectations. Effective teaching of the strategies relies on increasing levels of number sense, fluency and ability to reason mathematically. Pupils must be supported to gain depth of understanding within the strategy through the CPA approach and not learn strategies as a procedure.

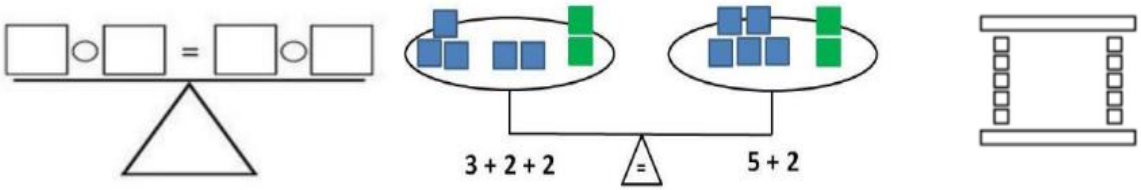
At BPSP, to ensure consistency of approach, we concentrate on one particular abstract method higher up the school. For example, we favour the column method of multiplication over the grid method. We will explore other methods should a child struggle with the preferred method or should we wish to enrich the children's experience and understanding of the options available to them. These preferred methods are highlighted in the abstract column.

# Maths Calculations and Representations Policy

**Teaching Equality**

It is important that equality (=) is also taught appropriately when teaching the four operations. Misconceptions that the '=' symbol indicates that an answer is needed are common and must be addressed early on. Teachers should present pupils with number sentences and problems which place the equals symbol in different positions, different contexts and with the inclusion of missing box problems, such as ☐ + 4 = 7; 7 = 3 + ☐, or 5 + 6 ☐ 7 + 4.

In the concrete phase, scales, Numicon and cubes provide useful resources to demonstrate equality. Pictorial representations of equality can also be used, as shown below:




**The Importance of Vocabulary**

Our mathematics curriculum places great emphasis on the importance of pupils using the correct mathematical language as a central part of their learning. Pupils will be unable to articulate their mathematical reasoning if they lack the mathematical vocabulary required to do so. It is therefore essential that the teaching of strategies outlined in this policy is accompanied by the use of appropriate mathematical vocabulary, as set out in our curriculum documentation.

New vocabulary should be introduced in a suitable context (for example, with relevant real objects, apparatus, pictures or diagrams) and explained carefully. High expectations of the mathematical language used are essential, with all staff modelling vocabulary and only accepting what is correct. For example:

| ☑ | ☒ |
|---|---|
| ones | units |
| is equal to | is |
| zero (0) | oh (the letter O) |
| number sentence / calculation | sum |

# Maths Calculations and Representations Policy

## Addition and Subtraction

## Glossary

**Addend -** A number to be added to another.

**Aggregation -** combining two or more quantities or measures to find a total.

**Augmentation -** increasing a quantity or measure by another quantity.

**Commutative –** numbers can be added in any order.

**Complement –** in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

**Difference –** the numerical difference between two numbers is found by comparing the quantity in each group.

**Exchange –** Change a number or expression for another of an equal value.

**Minuend –** A quantity or number from which another is subtracted.

**Partitioning –** Splitting a number into its component parts.

**Reduction –** Subtraction as take away.

**Subitise –** Instantly recognise the number of objects in a small group without needing to count.

**Subtrahend -** A number to be subtracted from another.

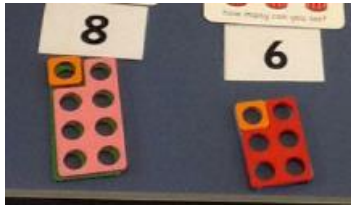
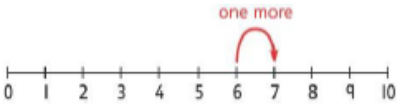
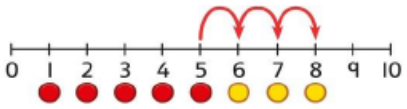
**Sum -** The result of an addition.

**Total –** The aggregate or the sum found by addition.

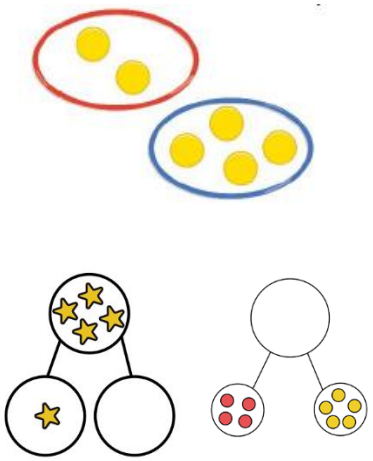
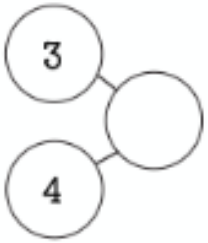
# Maths Calculations and Representations Policy

# Addition

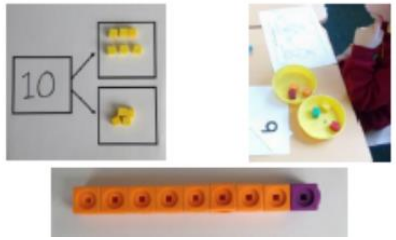
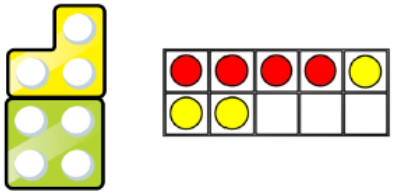
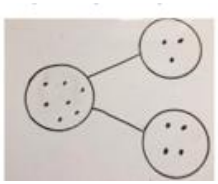
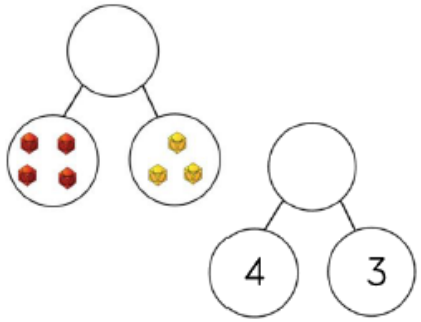
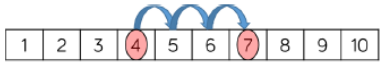
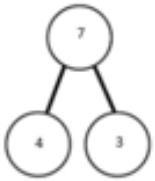
| | Guidance |
|---|---|
| **Pre-school** | Before addition can be introduced, pupils need to have a secure knowledge of number. In pre-school, pupils are introduced to the concept of counting, number order and number recognition through practical activities, games and child-initiated play.<br>Pupils also learn how to count 1-1 (pointing to each object as they count); they learn that anything can be counted, for example, claps, pupils and jumps. This is reinforced by opportunities for pupils to count in the outside provision, e.g. building blocks, lines on the floor, twigs etc. |

| | **Small Step** | **Guidance** | **Concrete** | **Pictorial** | **Abstract** |
|---|---|---|---|---|---|
| **Reception** | Counting and adding more | Pupils are introduced to the concept of addition through practical games and activities. They act out addition by physically combining two groups of objects together.<br><br>Pupils learn to link counting on with adding more than one. | Pupils add one more child, object, cube or counter to a group to find one more.<br><br>  <br>*One more than 4 is 5.*<br><br>  | Following modelling, pupils use a number line to support their understanding of adding one more by counting on.<br><br>**6 + 1 =**<br>  <br>*One more than 6 is 7.*<br>*7 is one more than 6.*<br><br>**5 + 3 =**<br>  | Adults support pupils in recording their addition sums in written form.<br><br>**3 + 2 = 5**<br><br>*'3 add 2 equals 5. We have got 5 altogether.'* |

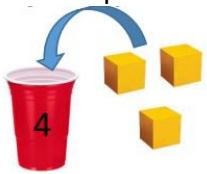
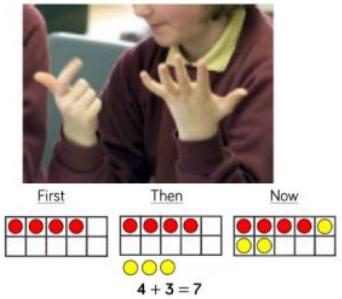
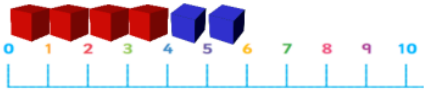
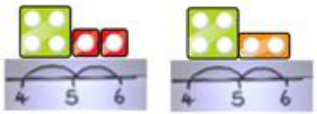
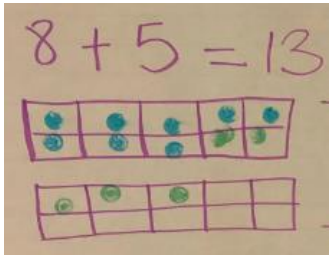
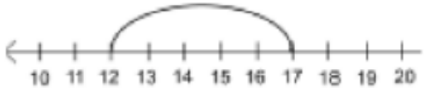
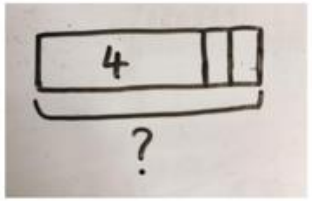
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Reception** | Understanding part - part - whole relationships | Pupils sort and split groups using modelled stem stences to develop their understanding of parts and wholes. | Pupils sort children and objects in to groups; they understand that these are parts and that together they make the whole.<br>  <br>*'The groups of children are 2 and 4. The parts are 2 and 4. There are 6 children. The whole is 6.'* | Pupils draw to represent the parts and understand the relationship with the whole.<br>  | Pupils use partially completed part-whole models to represent the numbers.<br>  |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Combine two parts to make a whole | When adding numbers to 10, pupils can explore both aggregation and augmentation.<br><br>Part- whole models, bar charts, number shapes and tens frames support aggregation.<br><br>Tens frames, bead strings and number tracks support augmentation. | Pupils use a range of concrete resources to combine two parts.<br>  <br>  <br><br>  <br>  | Pupils represent cubes and counters using dots or crosses.<br>  <br>Pupils add these to part whole models.<br>  <br>Number lines support counting on.<br>  | **4 + 3 = 7**<br>  <br>*"Four is a part, 3 is a part and the whole is seven."*<br>$4 + 3 = 7$<br>*4 add 3 is equal to 7.* |

# Maths Calculations and Representations Policy

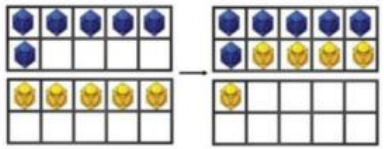
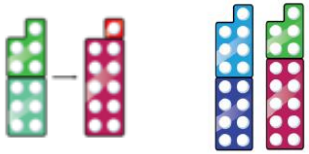
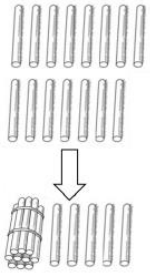
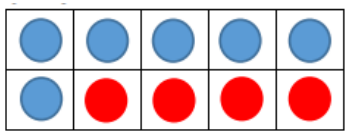
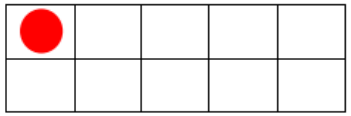
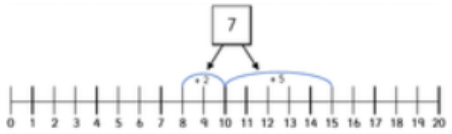
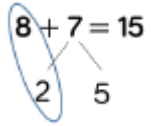
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Start at the bigger number and count on, using cubes, Numicon and counters | Counting on from the biggest number is an opportunity to introduce the commutativity of addition. | Pupils count on using cubes and cups.<br>  <br><br>They count on using fingers and tens frames with counters.<br>  <br><br>Pupils count on using a number line with cubes or Numicon.<br>  <br><br>  <br> | Pupils draw representations of the manipulatives that they have used.<br>  <br><br>*'5 more than 12 is equal to 17.'*<br>  <br><br>Pupils use a bar model which encourages them to count on, rather than count all.<br>  <br><br>*4 + 2 = 6* | Pupils make jottings of mental methods and show informal strategies.<br>A number line:<br>  <br><br>What is 2 more than 4?<br>What is the sum of 4 and 2?<br>What is the total of 2 and 4?<br>Commutative law:<br>*4 + 2 = 6; 2 + 4 = 6*<br>Mental method:<br>Put the largest number in your head and count on. |



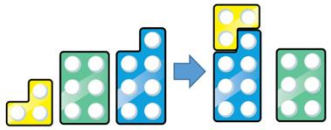
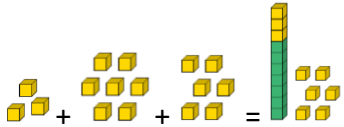
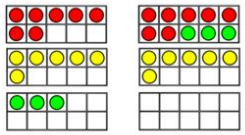
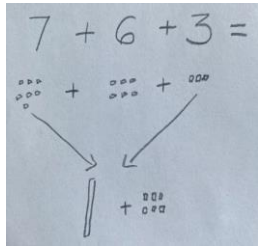
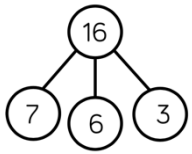
M. Underwood Sept. 2021

R. Blake Sept. 2022

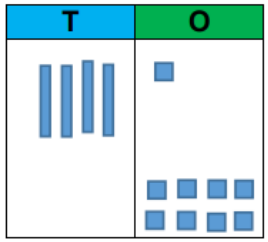
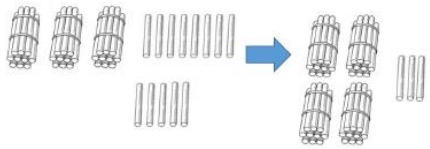
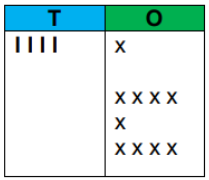
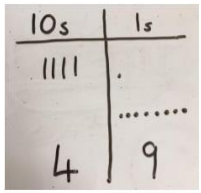
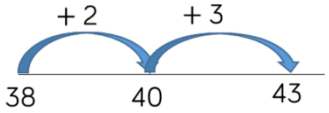
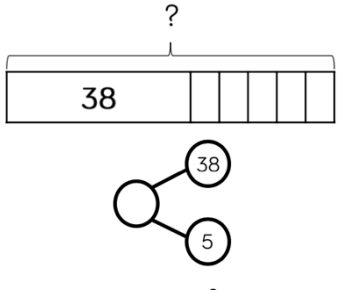
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Add by making 10 | When adding one digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.<br><br>Use concrete resources alongside number lines to support pupils in understanding how to partition their jumps. | Pupils regroup to make 10, using tens frames and counters/cubes, using Numicon or using straws.<br>  <br>  <br>  | Pupils draw tens frames and counters.<br>  <br>  <br>*'6 + 5 is the same as 10 + 1.'*<br>*'I know that 6 + 4 = 10, and 1 more gives a total of 11.'*<br><br>Pupils use a number line to add by making 10.<br><br>**8 + 7 = ☐**<br>  <br>*8 + 2 = 10*<br>*10 + 5 = 15*<br>*8 + 7 = 15* | Pupils develop an understanding of equality.<br>$6 + \square = 11$<br>$6 + 5 = 5 + \square$<br>$6 + 5 = \square + 4$<br><br>*'7 can be partitioned in to 2 and 5. I know that 8 and 2 make 10, and I can then add the remaining 5 to make 15.'*<br>  |

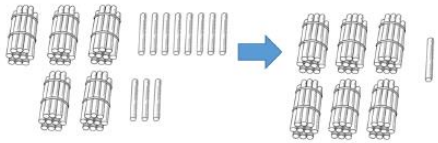
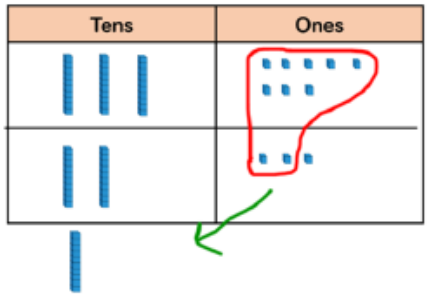
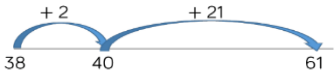
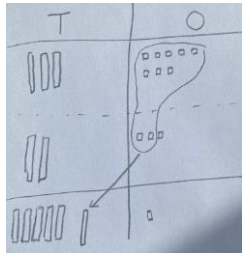
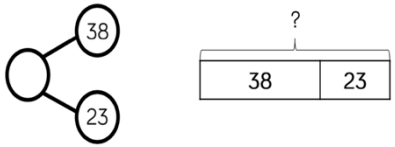
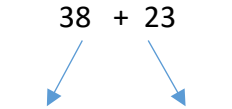
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Adding three single digits, crossing 10 | When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling ten. | Pupils add three single digits using Numicon or counters on tens frames.<br>  <br>Pupils add three 1 digit numbers using dienes.<br>  | Pupils draw tens frames and counters.<br>  <br>Pupils draw dienes to show exchanging.<br>  <br>Pupils complete part-whole models with up to three parts.<br>  | Pupils reason about their strategy.<br>$7 + 6 + 3 = 16$<br>*7 + 3 = 10*<br>*10 + 6 = 16* |

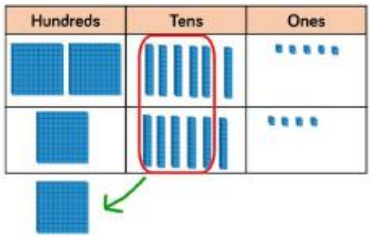
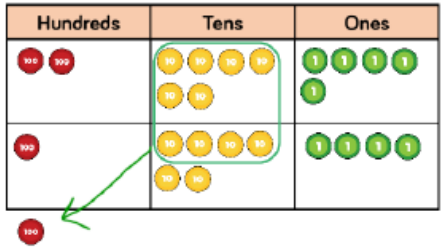
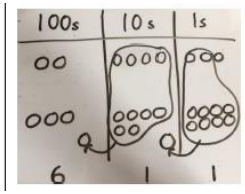
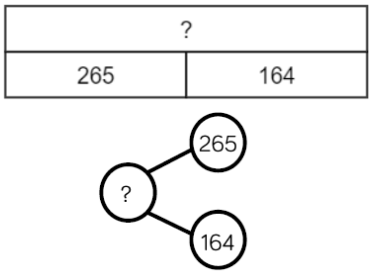
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Add 1 digit and 2 digit numbers to 100 | When adding single digits to a two-digit number, pupils should be encouraged to count on from the larger number.<br><br>They should apply their knowledge of number bonds to show efficiency.<br><br>Hundred squares and straws can support. | Pupils continue to develop an understanding of partitioning and place value.<br><br>**41 + 8**<br>  <br><br><br>**38 + 5**<br>  | Pupils represent dienes/base ten, e.g. lines for tens, dots or crosses for ones.<br>  <br><br>  <br><br><br>Pupils use blank number lines to count on from the larger number.<br>  <br><br><br>Pupils apply their knowledge of bonds.<br>  <br><br><br>They apply their thinking to bar models and part-whole models.<br>  <br> | Pupils make jottings to show how they have partitioned.<br><br>38 + 5 = 43<br>*'38 + 2 = 40*<br>*40 + 3 = 43'*<br><br>Mental method:<br>*'41 + 8 is the same as 40 + 9.'* |

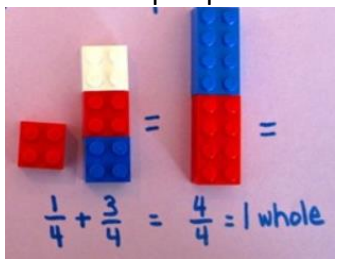
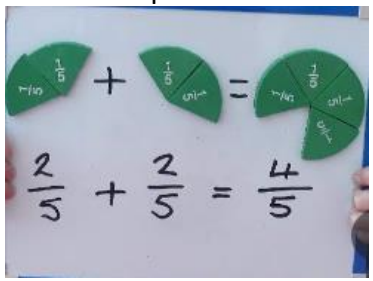
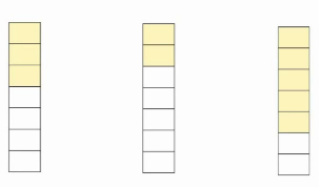
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Add two 2-digit numbers, to 100 | Encourage pupils to count on using manipulatives. This may bridge the tens boundary.<br><br>Pupils may exchange using manipulatives but do not need record this in a formal method.<br><br>Encourage them to jump to multiples of 10 to become more efficient. | Continue to group manipulatives, counting on from the largest number and using knowledge of bonds.<br><br>**38 + 23**<br>  <br><br>Pupils demonstrate an understanding of exchanging, when the tens boundary is bridged.<br>  | Pupils use a blank number line, jumping multiples of ten.<br>  <br><br>Pupils represent dienes/base ten and demonstrate that they have an understanding of adding the ones together first, then the tens.<br>  <br><br>Pupils apply their understanding to part-whole and bar models.<br>  | Pupils make jottings to show how they have used an expanded method.<br><br>$38 + 23 = 61$<br><br>**38 + 23 =**<br>  <br>30 + 20 = 50<br>8 + 3 = 11<br>50 + 11 = 61 |

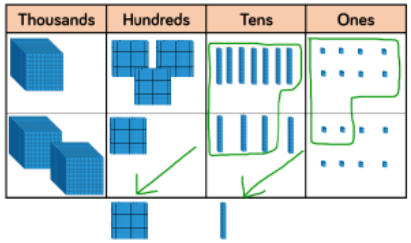
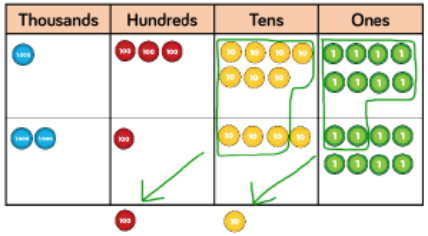
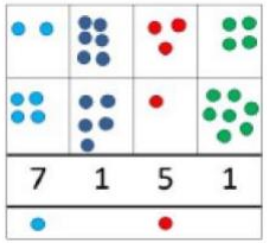
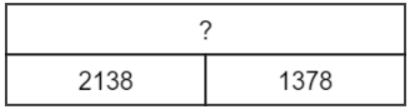
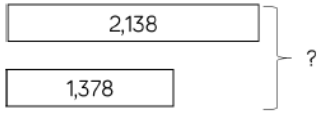
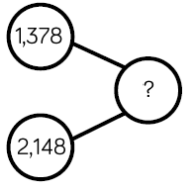
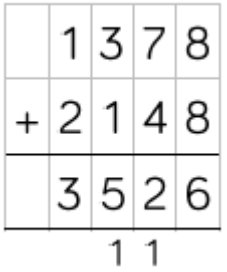
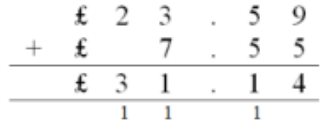
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Add numbers with up to 3 digits, including using column method with exchanging. | Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits.<br><br>Encourage pupils to use the formal column method when calculating alongside straws, base 10 or place value counters.<br><br>As numbers become larger, straws become less efficient.<br><br>*Pupils will use these methods to check subtraction answers.* | Pupils are familiar using a place value grid with manipulatives.<br><br>**265 + 164**<br>  <br><br>Pupils are confident with regrouping and exchanging.<br>  <br> | Pupils draw a pictorial representation of the columns and place value counters, circling when they make an exchange.<br><br>**243 + 368**<br>  <br><br>Pupils apply their understanding to a range of models.<br>  <br> | $265 + 164 = 429$<br><br>Pupils confidently use the formal column method, always starting with the ones column and exchanging when needed.<br><br>$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$<br><br>**243 + 368 =**<br><br>$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$ |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Add fractions with the same denominator, up to 1 whole | Pupils practise adding fractions with the same denominator through a variety of increasingly complex problems to improve fluency. | Pupils partition shapes and objects in to equal parts.<br>  <br><br>Pupils use concrete fraction circles/tiles or fraction walls to calculate the total amount of parts.<br>  <br> | Pupils draw and explore images and models which support adding parts of a whole. Drawing objects can give context to the fractions.<br>$\frac{5}{7} + \frac{1}{7}$<br>  <br>$\frac{1}{5} + \frac{2}{5}$<br>  <br>$\frac{3}{7} + \frac{2}{7}$<br>  | $\frac{2}{9} + \frac{5}{9} = \frac{7}{9}$<br>*Two parts out of nine and five parts out of nine make a total of seven parts out of nine.* |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Add numbers with up to 4 digits | Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.<br><br>Ensure pupils write out their calculation alongside any concrete resources so they can see the links to the written column method.<br><br>Plain counters on a place value grid can also be used to support learning.<br><br>*Pupils will use these methods to check subtraction answers.* | Pupils continue to use dienes or place value counters to add, exchanging 10 ones for a ten, 10 tens for a hundred and 10 hundreds for a thousand.<br><br>  <br><br>  | Pupils draw representations using a place value grid and other models.<br><br>**2634 + 4517**<br><br>  <br><br>  <br><br>  <br><br>  | $1,378 + 2,148 = 3,526$<br><br>Pupils will add numbers with up to 4-digits using the formal written method of column addition.<br><br>  <br><br>As the pupils become more secure, introduce decimals. Money can be used for context.<br><br>  |



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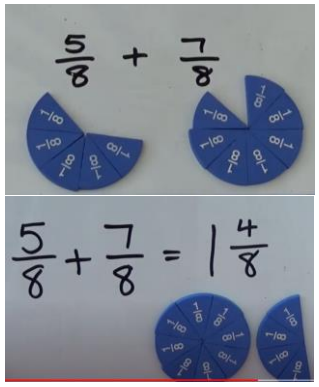
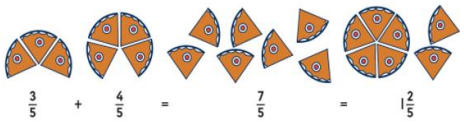
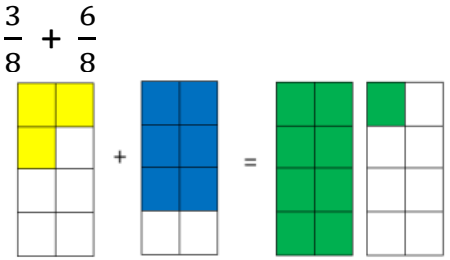
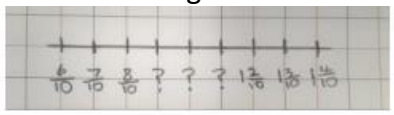
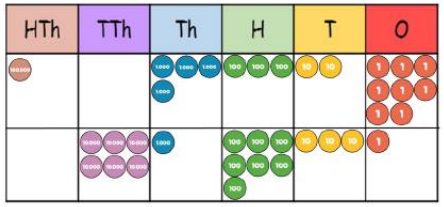
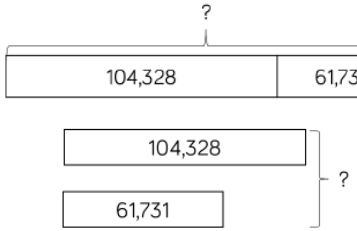
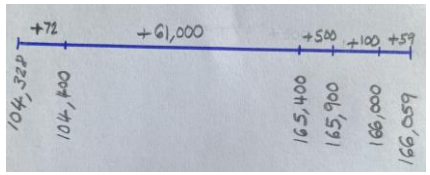
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Add fractions with the same denominator, including to total more than one whole | Pupils continue to add fractions with the same denominator, understanding that these can total more than one whole (improper fractions).<br><br>Pupils convert improper fractions in to mixed numbers. | Pupils use concrete resources to work out the total number of parts. Parts are regrouped to show wholes and parts.<br>  | Pupils become familiar when working with images that represent fractions.<br>  <br>Bar models/number frames are used to show parts and wholes.<br>  <br>  <br>Pupils count up in fraction amounts using a number line.<br>  | $\frac{5}{8} + \frac{6}{8} = \frac{11}{8} = 1\frac{3}{8}$<br><br>*Five parts out of eight and six parts out of eight, total eleven parts out of eight.*<br>*Eleven parts out of eight is the same as one whole and three parts out of eight.* |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Add numbers with more than 4 digits<br><br>*This small step is consolidated in Year 6.* | Pupils should be encouraged to work in the abstract, using the column method to add larger numbers.<br><br>*Pupils will use rounding to estimate answers before solving calculations.* | Place value counters or plain counters on a place value grid are the most effective concrete resources to support adding numbers with more than 4 digits.<br><br>  | Pupils develop reasoning skills by using a range of representations including part whole models, number sentences, place value counter problems and bar models.<br><br>Pupils can, if they need to, draw their own representations, using place value charts.<br><br>  <br>Pupils draw an empty number line and use it to count on.<br><br>  | $104{,}328 + 61{,}731 = 166{,}059$<br><br>Pupils use formal column addition for numbers with more than 4 digits.<br><br>1 0 4 3 2 8<br>+ 6 1 7 3 1<br>1 6 6 0 5 9<br>1 |



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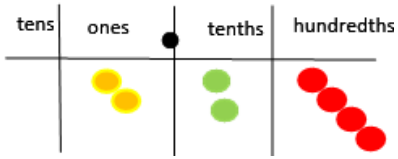
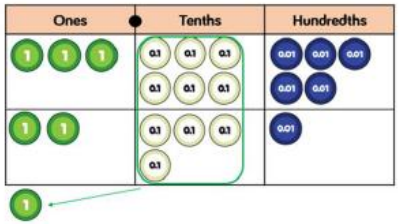
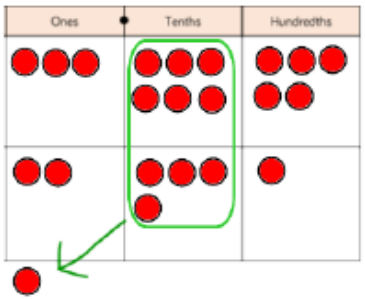
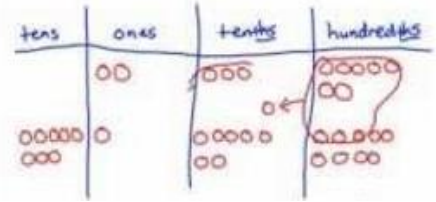
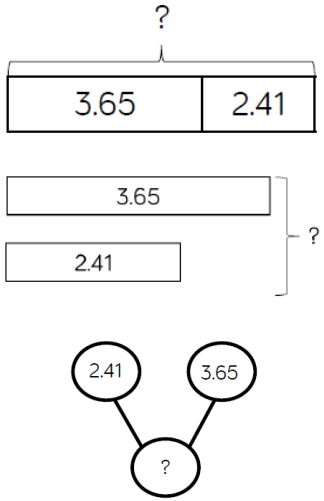
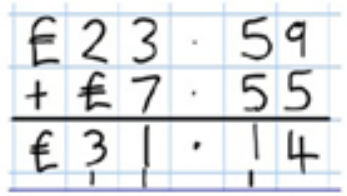
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Add numbers with up 3 decimal places<br><br>*This small step is consolidated in Year 6.* | Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2 and 3 decimal places.<br><br>Ensure pupils have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures. | Pupils begin to use decimal place value counters.<br>  <br>Pupils demonstrate exchanging, when adding.<br>  <br>  | Pupils draw a range of representations, including using a place value grid, bar models and part whole models.<br><br>**2.37 + 81.79 =**<br>  <br>**3.65 + 2.41 =**<br>  | $3.65 + 2.41 = 6.06$<br><br>Pupils use formal column addition.<br><br>3.65<br>+ 2.41<br>6.06<br>1<br><br>Money can be used to provide pupils with context.<br>  |



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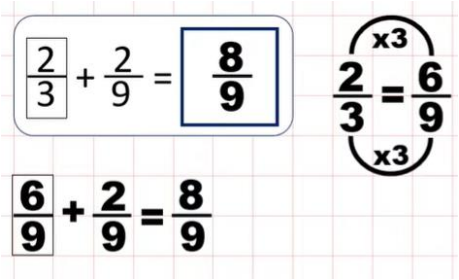
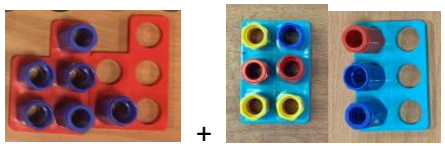
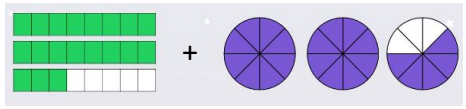
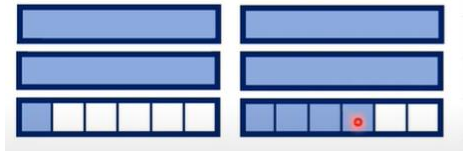
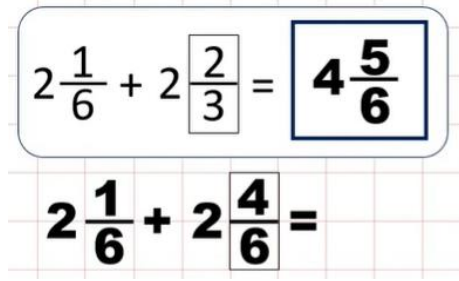
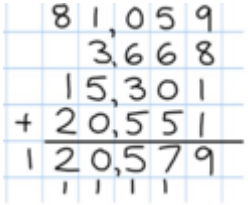
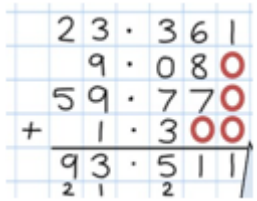
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Add fractions with denominators that are multiples of the same number | Pupils use their knowledge of times tables to find common multiples.<br><br>Pupils know that common denominators are numbers that both denominators will divide into evenly. | Pupils use paper strips to create fractions where one denominator is a multiple of the other. They convert one denominator into the other by splitting the fraction, so the denominators are equal.<br><br>$\frac{3}{8} + \frac{1}{4} = \frac{3}{8} + \frac{2}{8} =$<br><br>  | Pupils use a bar model to add fractions with demoninators that are common multiples.<br><br>$\frac{2}{5} + \frac{5}{10} =$<br><br>  <br><br>Pupils see that one fifth is the same as two tenths.<br><br>  <br><br><br>$\frac{1}{3} + \frac{5}{6} =$<br><br>  <br> | Pupils convert numbers with different denominators, so that they have the same (or common) denominator.<br><br>  <br> |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| Year Five | Add mixed numbers | Pupils use a range of strategies to add mixed numbers. | Pupils use Numicon to support their understanding of mixed numbers.<br>When using numicon, the base piece represents the denominator and the top pieces, or pegs, represent the numerator.<br>$1\frac{1}{5} + 1\frac{3}{6} =$<br>  | Pupils represent mixed numbers using drawings and bar models.<br>$2\frac{3}{8} + 2\frac{5}{8} =$<br>  <br>$2\frac{1}{6} + 2\frac{2}{3}$<br>  | Pupils convert mixed numbers to improper fractions, then add them together.<br>Pupils also add the whole numbers together first, then add the fractions together, using skills from the small step prior.<br>  <br>$2\frac{1}{6} + 2\frac{4}{6} =$ |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Add several numbers of increasing complexity | Pupils add a range of numbers up to ten million, including adding money, measures, and decimals, with different numbers of decimal places. | Pupils select appropriate manipulatives, when necessary. | Pupils draw a range of representations to support reasoning responses. | Pupils identify that they only need to use formal column addition for numbers that cannot be added mentally.<br>  <br>When adding decimals, pupils automatically insert zeros for place holders.<br>  |



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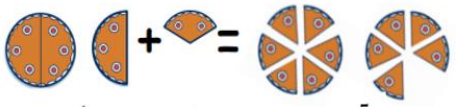
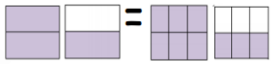
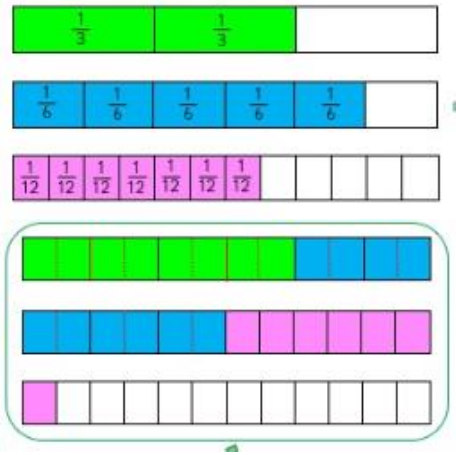
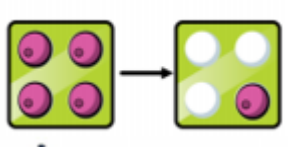
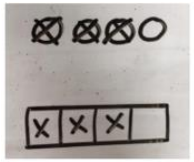
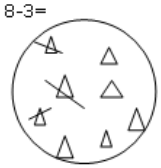
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Use equivalent fractions to add numbers with different denominators | Pupils add fractions with different denominators and add mixed numbers, using the concept of equivalent fractions.<br><br>Pupils are encouraged to find the least common denominator (the smallest multiples that the denominators have in common). | Pupils select appropriate manipulatives, when necessary. | Pupils use a range of representations, including bar models.<br><br>$1\frac{1}{2} + \frac{1}{3} =$<br><br>  <br><br>  <br><br>$\frac{2}{3} + \frac{5}{6} + \frac{7}{12} =$<br><br>  | Pupils are encouraged to revert to expanded methods if they experience any difficulty.<br><br>$1\frac{1}{2} + \frac{1}{3} = 1\frac{5}{6}$<br><br>because $1\frac{1}{2} = \frac{3}{2}$<br><br>$\frac{3}{2} = \frac{9}{6}$ and $\frac{1}{3} = \frac{2}{6}$<br><br>so $\frac{9}{6} + \frac{2}{6} = \frac{11}{6} = 1\frac{5}{6}$ |

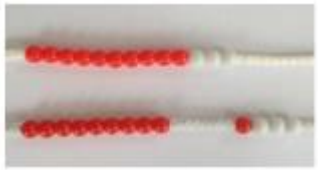
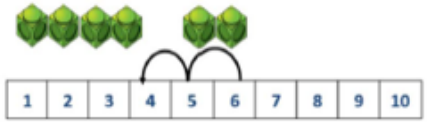
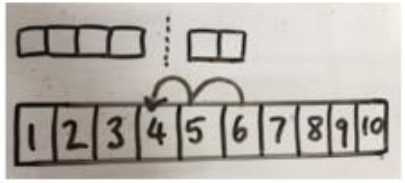
# Maths Calculations and Representations Policy

## Subtraction

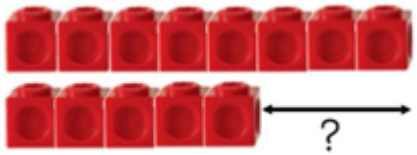
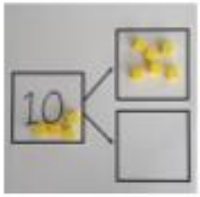
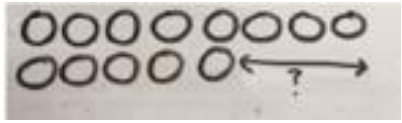
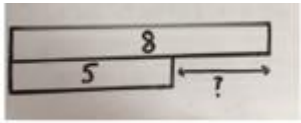
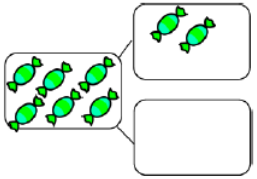
| | Guidance |
|---|---|
| **Pre-school** | Before subtraction can be introduced, pupils need to have a secure knowledge of number. In pre-school, pupils are introduced to the concept of counting backwards through child-initiated games such as acting out counting songs and running races, *e.g. pupils shouting "5,4,3,2,1,0 - GO!".* |

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Reception** | Physically take away objects from a whole | Pupils build on their previous knowledge by learning that subtracting means taking away a certain number of objects from a group (leaving them with fewer objects).<br><br>Use part-whole models, bar models, ten frames and number shapes to support partitioning. | Pupils arrange objects and remove some to find how many are left.<br><br>**4 – 3 =**<br>  <br><br>**6 – 1 =**<br>  <br>*1 less than 6 is 5.*<br>*6 subtract 1 is 5.* | Pupils match images and drawings that are the same as their subtraction number sentence/story.<br><br>  <br>  <br><br>Pupils say one less using a number track to support their counting.<br><br>  | Adults support pupils in recording their subtractions in written form.<br><br>**5 – 3 = 2**<br><br>*'5 take away 3 equals 2. We have got 2 left.'* |

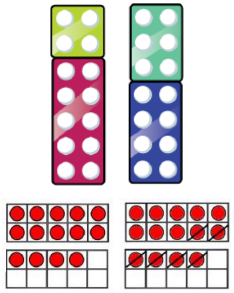
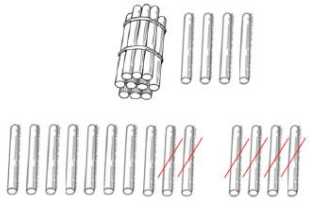
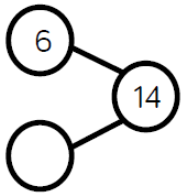
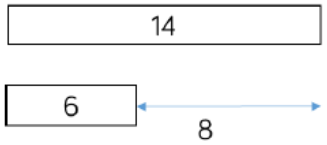
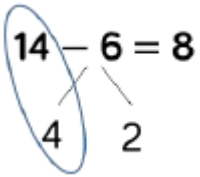
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Counting back | Pupils use ten frames, number tracks, single bar models and bead strings for support. | Pupils use bead strings to count back, counting backwards in ones as they move the beads along.<br>  <br>Pupils use counters or cubes and move them away from the group, counting backwards as each one is moved away.<br>  | Pupils count back using number lines or number tracks.<br>  <br><br>Pupils represent what they see using drawings.<br>  <br> | **6 – 2 = 4** |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Finding the difference | Pupils use cubes and bar models with two bars to support finding the difference.<br><br>Pupils show this understanding using bar models and part-whole models. | Finding the difference, using cubes, Numicon or Cuisenaire rods, as well as other objects.<br><br>**Calculate the difference between 8 and 5:**<br>  <br><br><br>Pupils use the part-whole model to help explain the inverse relationship between addition and subtraction.<br><br>**10 – 6 =**<br>  <br> | Pupils draw the concrete objects, which they have used.<br>  <br><br><br>Pupils use a bar model to illustrate what they need to calculate.<br>  <br><br><br>Pupils draw objects within a part-whole model.<br>**6 – 2 =**<br>  | Pupil transfer their understanding to missing box problems and reasoning questions.<br><br>**8 – 5 =**<br><br>The difference is ☐<br><br>**9 – 6 =**<br>**8 – 5 =**<br>**7 – 4 =**<br>Why do these calculations have the same difference?<br><br>Pupils move to using numbers within a part-whole model.<br>  <br> |

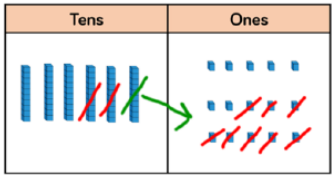
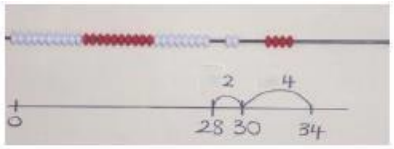
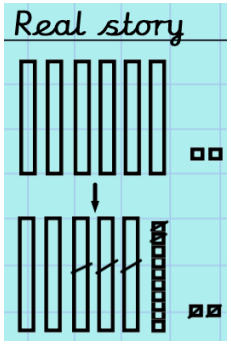
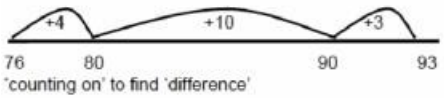
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Subtract numbers up to 20 by making 10 | Pupils should be encouraged to find the number bond to 10 when partitioning the subtracted number.<br><br>Ten frames, number shapes and number lines are particularly useful to support this. | Pupils demonstrate their understanding using a range of manipulatives and concrete supports.<br><br>**14 – 6 =**<br>  <br><br>Pupils demonstrate exchanging a bundle of ten straws for ten individual straws.<br>  <br><br>Pupils physically move counters on a number track to count back.<br>  | Part-whole models, bar models and number lines support pupils understanding of subtraction.<br>  <br>  <br><br>Pupils show their understanding of partitioning using a number line.<br>  | Pupils demonstrate the mental strategy of partitioning using heir knowledge of number bonds.<br>  <br>*'14 – 6 is the same as 14 – 4 – 2.*<br>*14 – 4 = 10*<br>*10 – 2 = 8'*<br><br>**14 – 6 = 8** |

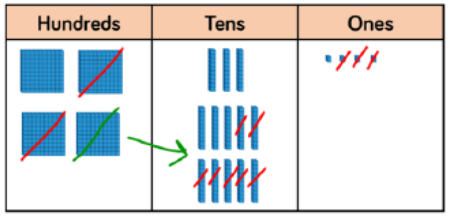
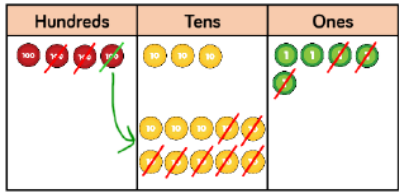
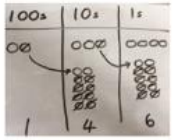
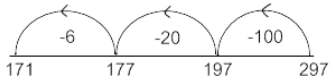
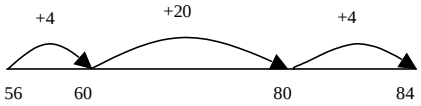
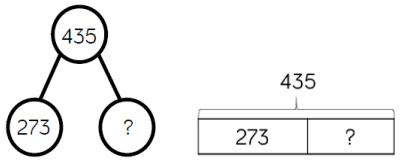
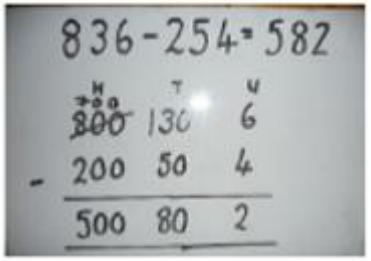
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Use place value to subtract without exchanges | Pupils use manipulatives (such as straws, base 10 or place value counters) to calculate subtraction. | Pupils use base ten on a place value chart. They do not have to exchange tens for ones.<br><br>**34 – 13 =**<br><br>  | Pupils move on to using jottings and they represent the base ten pictorially.<br><br>**43 – 21 =**<br><br>  <br><br>Where appropriate, pupils use number lines to count back in multiples.<br><br>**75 – 30 =**<br><br>  <br>*'75 – 30 is the same as 75 – 10 – 10 – 10.'* | **43 – 21 = 22** |

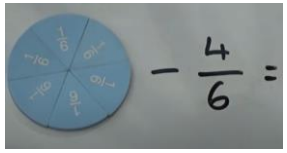
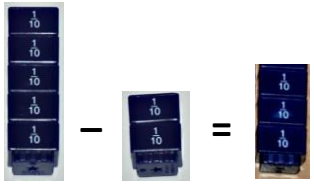
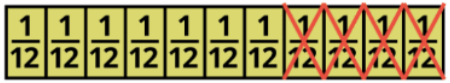
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Use place value to subtract while crossing the 10 (exchange) | Progression in this step sees pupils crossing one ten before crossing more than one ten.<br><br>Pupils use a blank number line to count back to find the difference. Encourage them to jump to multiples of 10 to become more efficient.<br><br>Pupils develop an understanding that, once exchanged, there are more than ten ones in the ones column on a place value grid. | Pupils use base 10 to support and model physical exchanges.<br><br>**65 – 25 =**<br>  <br><br><br>Pupils use a bead string to count on to the next ten and then the rest.<br><br>**34 – 28 =**<br>  <br><br>*'The difference between 28 and 30 is 2. The difference between 30 and 34 is 4. The total difference is 6.'* | Pupils represent base ten pictorially, remembering to show the exchange.<br><br>  <br><br><br>Pupils use a number line to count on to the next ten and then the rest.<br><br>  <br><br>'counting on' to find 'difference' | Pupils start to record subtraction using expanded methods.<br><br>**65 – 38 =**<br><br>15 – 8 = 7<br>50 – 30 = 20<br><br>**65 – 38 = 27** |

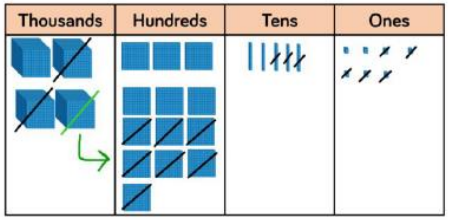
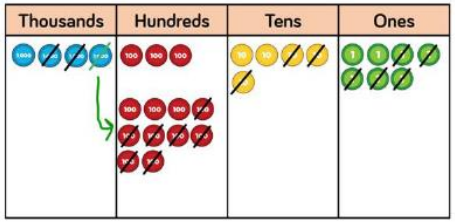
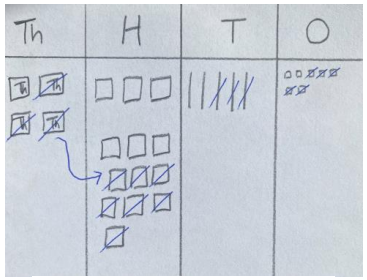
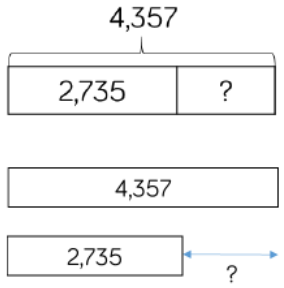
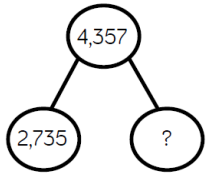
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Use column method up to 3 digits, with exchanges | Pupils will first be introduced to the formal column method without exchanges.<br><br>Pupils are encouraged to use the formal column method when calculating, alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.<br><br>*Pupils will use these methods to check addition answers.* | Pupils use manipulatives within a H, T, O place value grid. Manipulatives are exchanged where needed and removed from the grid as they are subtracted.<br><br>**435 - 273 =**<br>  <br><br>  <br><br>Plain counters on a place value grid can also be used to support learning. | Jottings and informal methods support pupils' mental calculations. Pupils represent manipulatives pictorially, showing what has been exchanged.<br><br>**234 – 88 =**<br>  <br><br>Pupils use an empty number line to count back and to count on to find the difference.<br>**297 – 126 =**<br>  <br><br>**84 – 56 =**<br>  <br><br>  <br> | Pupils begin by partitioning into the place value columns.<br>  <br><br>Pupils write out their calculation alongside any concrete resources so that they can see the links to the written column method.<br>**435 – 273 = 262**<br>Pupils show an understanding of what has happened when they have crossed out digits.<br>3 1<br>4 3 5<br>– 2 7 3<br>2 6 2 |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Subtract fractions with the same denominator up to 1 whole | Pupils practise subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency. | Pupils partition shapes and objects into equal parts.<br>Pupils use concrete fraction circles/tiles or fraction walls to calculate the total amount of parts.<br>  <br>Unifix cubes or fraction equivalency cubes can be used.<br>  | Pupils draw and explore images and models which support subtracting parts of a whole. Drawing objects can give context to the fractions.<br>  <br>Pupils subtract by crossing out on labelled and unlabelled fraction strips.<br>  <br>  | Colours may be used to prompt the pupils to only subtract the numerators.<br>Subtract the numerators<br>Keep the same denominator<br>$\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$<br>$\frac{6}{7} - \frac{2}{7} =$<br>*Six parts out of seven take away two parts out of seven leaves four parts out of seven.* |

# Maths Calculations and Representations Policy

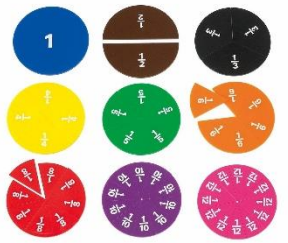
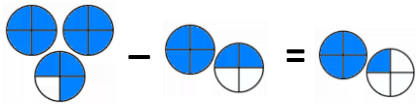
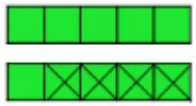
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Subtract numbers with up to 4 digits including exchanges | Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 digits.<br><br>Pupils write out their calculation alongside any concrete resources so that they can see the links to the written column method. | Pupils continue to use manipulatives and place value grids to support learning.<br><br>  <br><br><br>  <br><br><br>Plain counters on a place value grid can also be used. | Pupils to draw manipulatives and show their exchange. This can then be transferred to a range of representations.<br><br>  <br><br><br>  <br><br><br>  <br> | Pupils demonstrate a number of exchanges.<br><br>$4{,}357 - 2{,}735 = 1{,}622$<br><br>$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \\ \hline \end{array}$$<br><br>Decimal subtraction can be introduced through the context of money.<br><br>$$\begin{array}{r} £52.79 \\ -\ £26.85 \\ \hline £25.94 \\ \hline \end{array}$$ |



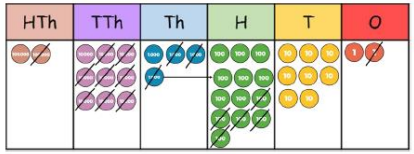
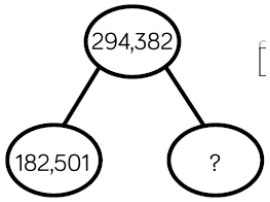
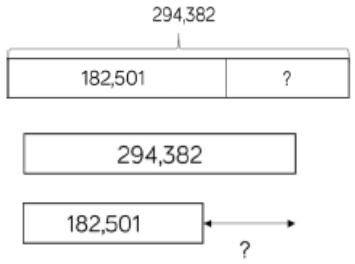
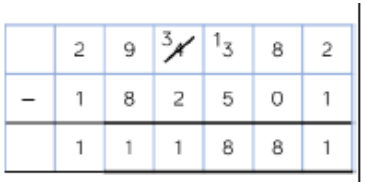
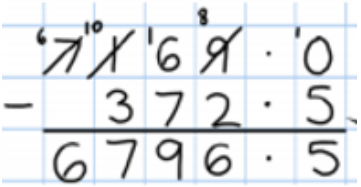
M. Underwood Sept. 2021

R. Blake Sept. 2022

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Subtract fractions with the same denominator, including numbers more than one whole | Pupils subtract fractions and numbers that can total more than one whole (improper fractions), continuing to work with numbers with the same denominator.<br><br>Pupils convert improper fractions in to mixed numbers. | Pupils use concrete resources to work out the total number of parts. Parts are regrouped to show wholes and parts.<br><br>  | Pupils become familiar when working with images that represent fractions.<br><br>$2\frac{3}{4} - 1\frac{2}{4} =$<br><br>  <br><br>Bar models/number frames are used to show parts and wholes.<br><br>$\frac{10}{5} - \frac{4}{5} =$<br><br>  <br><br>Pupils count back in fraction amounts using a number line. | $1\frac{3}{8} = \frac{11}{8}$<br><br>$\frac{11}{8} - \frac{6}{8} = \frac{5}{8}$<br><br>*One whole and three parts out of eight is the same as eleven parts out of eight.*<br>*Eleven parts out of eight take away six parts out of eight, leaves five parts out of eight.* |

# Maths Calculations and Representations Policy

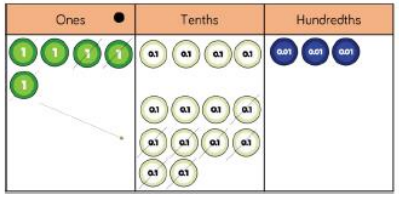
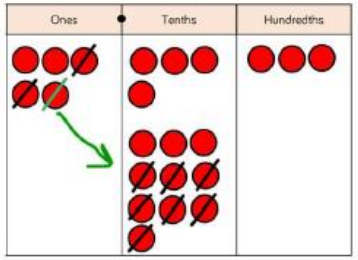
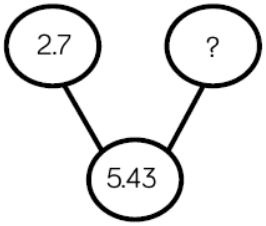
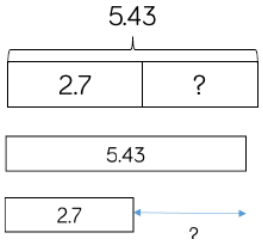
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Subtract numbers with more than 4 digits<br><br>*This small step is consolidated in Year 6.* | Pupils should be choosing the most efficient strategies to solve subtraction calculations.<br><br>*Pupils will use rounding to estimate answers before solving calculations.* | Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers with more than 4 digits.<br><br>  | Pupils develop reasoning skills by using a range of representations including part whole models, number sentences, place value counter problems and bar models.<br><br>  <br>  <br>Pupils can, if they need to, draw their own representations, using place value charts. | Pupils should be encouraged to work in the abstract, using coloumn method to subtract larger number efficiently.<br><br>294,382 − 182,501 = 111,881<br><br>  <br>Pupils subtract large numbers and decimals. They show an understanding of where place holders are required.<br><br>  |



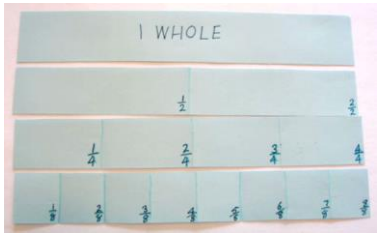
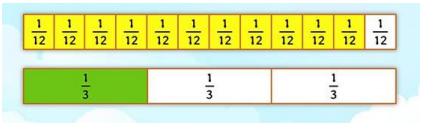
M. Underwood Sept. 2021

R. Blake Sept. 2022

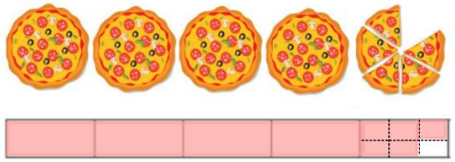
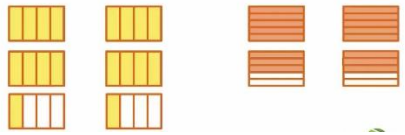
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Subtract numbers with up to 3 decimal places<br><br>*This small step is consolidated in Year 6.* | Pupils have experience of subtracting decimals with a variety of decimal places. This includes subtracting money and other measures.<br><br>Pupils subtract with decimal values, including mixtures of integers and decimals, ensuring they align the decimal. | Place value decimal counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.<br><br>  <br><br>  | Pupils draw a range of representations, including using a place value grid, bar models and part whole models.<br><br>  <br><br>  | Pupils use formal column subtraction. Money can be used to provide pupils with context.<br><br>$5.43 - 2.7 = 2.73$<br><br>$\begin{array}{r} {}^{4}\cancel{5}^{1}.43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$ |

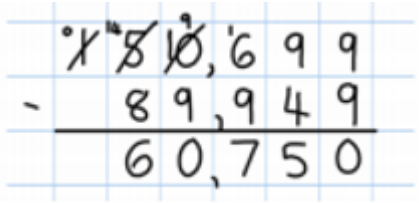
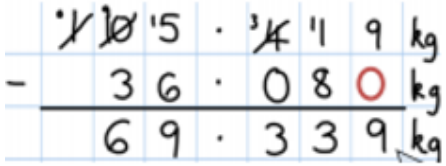
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Subtract fractions with denominators that are multiples of the same number | Pupils use their knowledge of times tables to find common multiples.<br><br>Pupils know that common denominators are numbers that both denominators will divide into evenly. | Pupils use paper strips to create fractions where one denominator is a multiple of the other. They convert one denominator into the other by splitting (folding) the fraction, so the denominators are equal.<br><br>$\frac{3}{4} - \frac{2}{8} =$<br><br>  | Pupils use a bar model to subtract fractions with demoninators that are common multiples.<br><br>$\frac{3}{4} - \frac{2}{3} =$<br><br>  <br><br>$\frac{11}{12} - \frac{1}{3} =$<br><br>  | Pupils convert numbers with different denominators, so that they have the same (or common) denominator.<br><br>$\frac{2}{3} - \frac{1}{6} =$ |

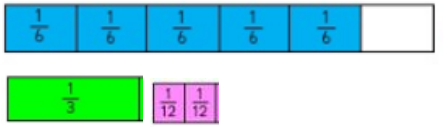
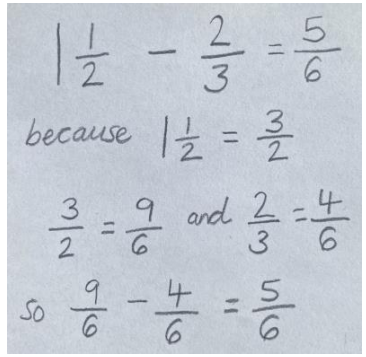
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Subtract mixed numbers | Pupils use a range of strategies to subtract mixed numbers. | Pupils use Numicon to support their understanding of mixed numbers.<br>When using numicon, the base piece represents the denominator and the top pieces, or pegs, represent the numerator.<br>$1\frac{3}{6} - 1\frac{1}{5} =$<br>  | Pupils represent mixed numbers using drawings and bar models.<br>There are $4\frac{5}{6}$ pizzas.<br>Abbey eats $2\frac{1}{3}$ pizzas.<br>How much pizza is left?<br>  <br>$2\frac{1}{4} - 1\frac{3}{5} =$<br>  | Pupils convert mixed numbers to improper fractions, then calculate the difference.<br>$4\frac{5}{6} - 2\frac{1}{3}$ |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Subtract increasingly large and more complex numbers and decimal values | Pupils subtract a range of numbers up to ten million, including adding money, measures, and decimals, with different numbers of decimal places. | Pupils select appropriate manipulatives, when necessary. | Pupils draw a range of representations to support reasoning responses. | Pupils identify that they only need to use formal column subtraction for numbers that cannot be added mentally.<br>  <br>When subtracting decimals, pupils automatically insert zeros for place holders.<br>  |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Use equivalent fractions to subtract numbers with different denominators | Pupils add fractions with different denominators and add mixed numbers, using the concept of equivalent fractions.<br><br>Pupils are encouraged to find the least common denominator (the smallest multiples that the denominators have in common). | Pupils select appropriate manipulatives, when necessary. | Pupils use a range of representations, including bar models.<br><br>$\frac{5}{6} - \frac{1}{3} - \frac{2}{12} =$<br><br>  <br> | Pupils are encouraged to revert to expanded methods if they experience any difficulty.<br><br>  <br><br><br>Pupils simplify fractions where needed. |

# Maths Calculations and Representations Policy

## Multiplication and Division

## Glossary

**Array –** An ordered collection of counters, cubes or other item in rows and columns.

**Commutative –** Numbers can be multiplied in any order.

**Dividend –** In division, the number that is divided.

**Divisor –** In division, the number by which another is divided.

**Exchange –** Change a number or expression for another of an equal value.

**Factor –** A number that multiplies with another to make a product.

**Multiplicand –** In multiplication, a number to be multiplied by another.

**Partitioning –** Splitting a number into its component parts.

**Product –** The result of multiplying one number by another.

**Quotient –** The result of a division

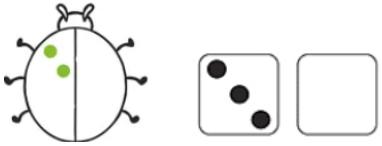
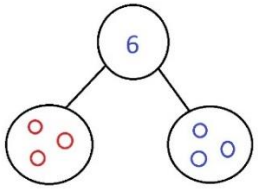
**Remainder –** The amount left over after a division when the divisor is not a factor of the dividend.

**Scaling –** Enlarging or reducing a number by a given amount, called the scale factor

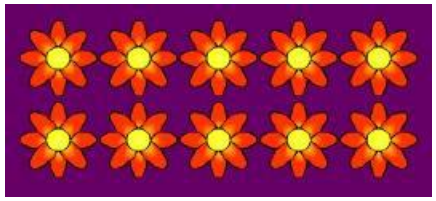
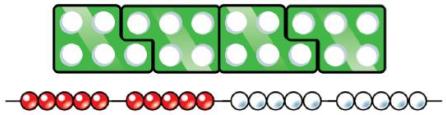
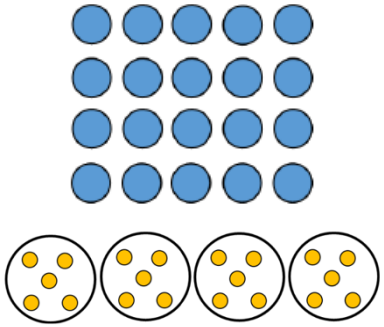
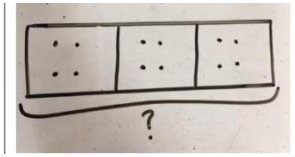
# Multiplication

| | Guidance |
|---|---|
| **Pre-school** | Pupils are introduced to the concept of doubling through practical games and activities, including the use of mirrors, to explore the concept that two objects or groups are the same. Matching activities can help teach visual discrimination, which is important as pupils learn to read letters and numbers. |

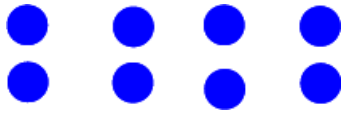
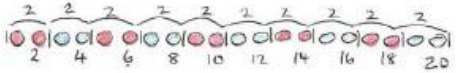
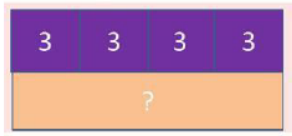
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Reception** | Double numbers and quantities of objects up to 5+5 | Pupils are expected to understand the concept of doubling and to be able to double a number up to 10.<br><br>Before doubling can be introduced, children need to have a secure knowledge of counting, number facts and addition in order to double.<br><br>Pupils explore odd and even numbers, whilst doubling. | Pupils carry out practical activities using manipulatives, such as cubes and Numicon, to demonstrate doubling.<br>   <br>  <br>Pupils act out doubling by physically combining two equal groups.<br>  | Pupils use known representations to draw the 'mirrored' amount of a number.<br>  <br>Pupils draw representations of the objects they have used.<br>  <br>Pupils transfer their understanding of doubles to part-whole models.<br>  | With support, pupils complete rehearsed sentence stems.<br><br>***Double 4 is ___.***<br><br>***4 and 4 makes ___.*** |

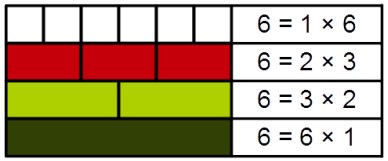
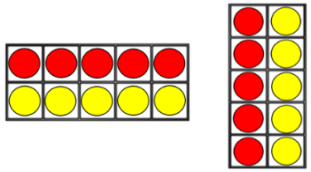
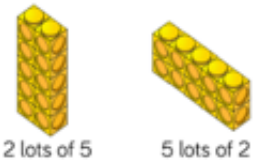
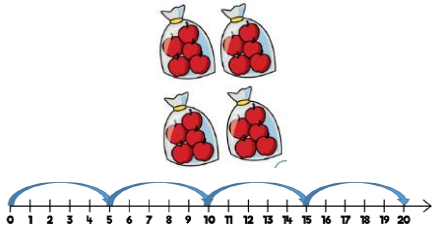
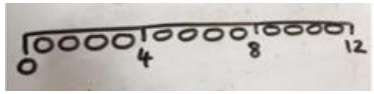
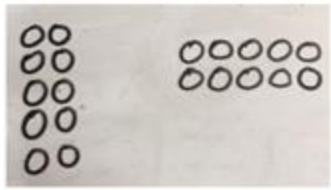
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Use arrays and repeated addition to solve 1-step multiplication problems | Pupils represent multiplication as repeated addition in many different ways.<br><br>Pupils use concrete and pictorial representation to solve problems. They are not expected to record multiplication formally. | Pupils use objects laid out in arrays to find the answers to simple problems.<br>  <br>  <br>Pupils organise manipulatives to show repeated addition of equal groups.<br>  | Pupils represent the practical resources using drawings.<br>  <br>Pupils show their understanding of repeated addition on a bar model.<br>  | Pupils represent repeated addition using the addition symbol.<br><br>$5 + 5 + 5 + 5 = 20$<br><br>***'4 lots of 5 makes 20.'*** |

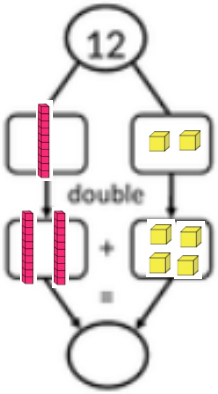
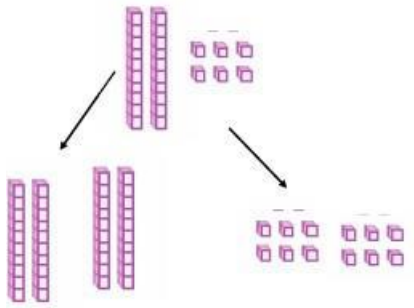
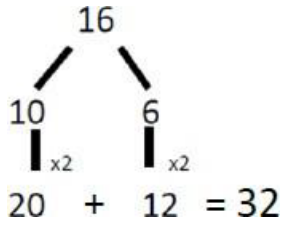
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Count in multiples *(2, 5, 10)* | Pupils count in multiples of 2, 5 and 10 aloud.<br><br>Pupils to jump in multiples of 2s, 5s and 10s along a structured number line or number track. | Pupils count the group as they are skip counting.<br>  <br>Pupils may use their fingers to help remember the groups they have counted.<br>  | Pupils draw representations to show counting in multiples.<br>  <br>Pupils show their skip counting on a structured number line or track.<br>  <br>Pupils use a bar model to show multiples.<br>  | Pupils write sequences with multiples of numbers.<br><br>*2, 4, 6, 8, 10*<br><br>*5, 10, 15, 20, 25, 30* |

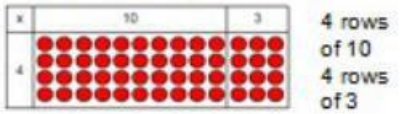
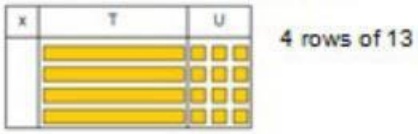
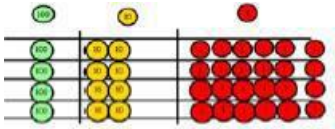
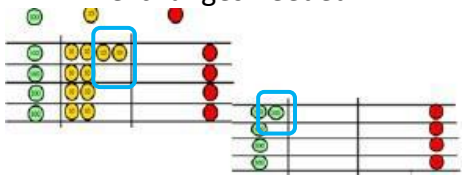
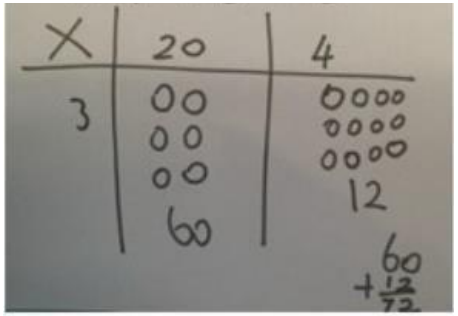
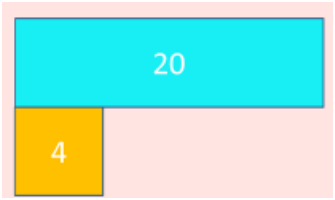
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Solve problems including repeated groups of multiples | Pupils are introduced to the multiplication symbol.<br><br>Pupils understand that multiplication is commutative. They understand that the order of the multiplication does not change the answer.<br><br>*This should be taught alongside division so that pupils learn how the two operations work together.* | Pupils use cuisenaire rods to solve problems involving repeated groups.<br><br>  <br><br><br>Pupils create arrays, using objects such as counters and cubes, to illustrate commutativity.<br><br>  <br><br>  <br> | Pupils use a number line to solve repeated groups of multiples.<br><br>One bag holds 5 apples.<br>How many apples do 4 bags hold?<br><br>  <br><br>Pupils draw their own number lines.<br>**4 x 3 =**<br><br>  <br><br><br>Pupils draw arrays to illustrate commutativity of multiplication facts.<br>**2 x 5 =**<br><br>  | Pupils use the multiplication symbol to represent a range of calculations that they have solved.<br><br>**4 x 5 = 20**<br>**5 x 4 = 20**<br>**20 = 4 x 5**<br>**20 = 5 x 4** |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Doubling numbers using partitioning | Pupils partition a number and then double each part before recombining it back together.<br><br>Pupils have an understanding that doubling means to multiply by two. | Pupils demonstrate doubling using dienes and place value counters to partition the number.<br><br>**Double 12:**<br>  | Pupils draw pictures and representations to demonstrate how to double numbers through partitioning.<br><br>**Double 26:**<br>  | Pupils use an expanded part-whole model to show how they have partitioned the number, before doubling each part.<br>They show how the parts are recombined, using addition.<br><br>**Double 16:**<br>  |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Use informal methods to multiply a 2 digit number by a 1 digit number, with and without exchanges | Pupils use their knowledge of arrays when they are first introduced to the grid method.<br><br>Pupils use partitioning to support their construction of the grid method.<br><br>Pupils explore a range of manipulatives, encouraging them to work towards selecting a more efficient method of calculation. | Pupils make arrays using counters.<br>**4 x 13 =**<br>  <br><br>Pupils move on to base ten to move towards a more compact method.<br>  <br><br>They then move on to place value counters to show finding groups of a number.<br><br>**4 x 126 =**<br>Pupils fill each row with counters.<br>  <br>They then add up each column, starting with the ones, making any exchanges needed.<br>  | Pupils represent their work with place value counters in a way that they understand.<br>They can draw the counters using colour to show different amounts or draw circles in the different columns to show their thinking.<br><br>**24 x 3 =**<br>  <br><br>Pupils use bar models to explore missing numbers.<br><br>**4 x ☐ = 20**<br>  <br> | Pupils multiply by one digit numbers, showing the clear addition alongside.<br><br>**7 x 35 =**<br>  <br><br>**210 + 35 = 245**<br><br>They use mental methods where appropriate.<br><br>*'I know that 7 x 3 is 21, so therefore 7 x 30 is 210.'* |



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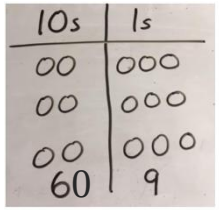
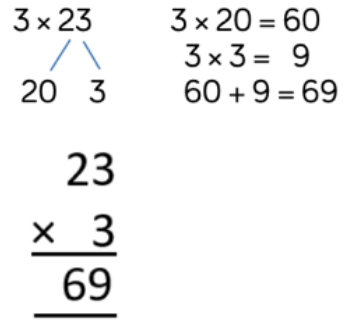
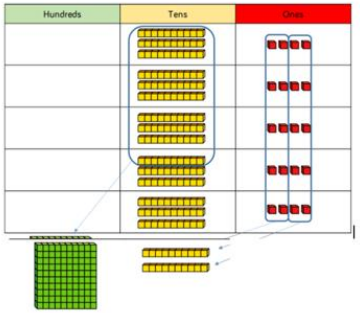
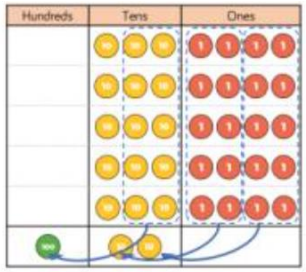
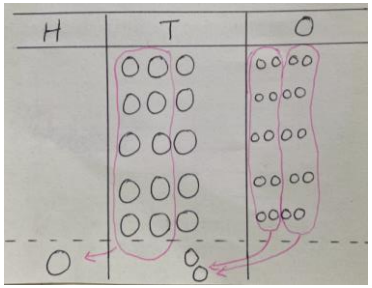
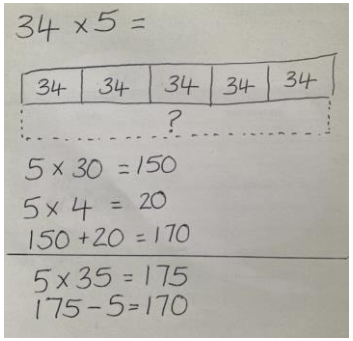
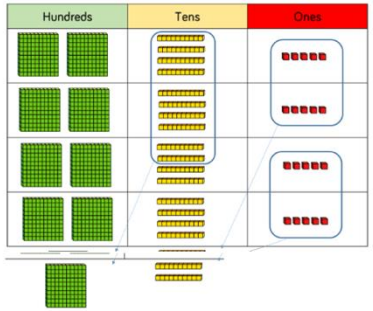
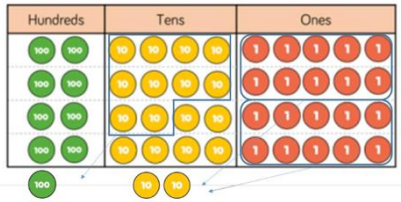
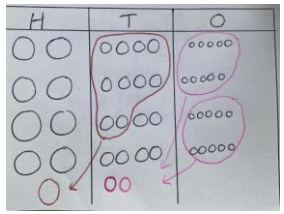
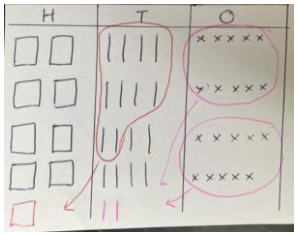
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Use formal written methods to multiply a 2 digit number by a 1 digit number, with no exchanges | Pupils explore the expanded method of multiplication by making the calculations concretely and then drawing them alongside a written method to aid understanding before moving on to short multiplication. | Pupils can continue to be supported by place value counters and base ten at this stage of multiplication. This is initially done where there is no regrouping.<br><br>It is important at this stage that pupils always multiply the ones column first.<br><br>Pupils use a place value grid to demonstrate how numbers have been partitioned before multiplying each group.<br><br>**23 x 3 =**<br>  <br><br>*'3 lots of 20 is 60.*<br>*3 lots of 3 is 9.*<br>*6 tens and 9 ones is 69.'* | Pupils represent their use of manipulatives pictorially.<br><br>**23 x 3 =**<br>  <br> | Pupils record what it is they are doing in order to show their understanding of number composition.<br><br>**23 x 3 =**<br>  <br><br>Pupils move on to recording using the formal short multiplication columnar method. |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Use formal written methods to multiply a 2 digit number by a 1 digit number, with exchanges | As before, pupils explore the expanded method of multiplication by making the calculations concretely and then drawing them alongside a written method to aid understanding before moving on to short multiplication.<br><br>Pupils explore and demonstrate their understanding of regrouping. | Pupils use base ten and place value counters to support their understanding of the method rather than supporting multiplication.<br>Pupils should use their times tables facts when solving multiplication.<br>**34 x 5 =**<br>  <br><br>Pupils are able to explain any regrouping.<br>  <br> | Pupils draw the manipulatives that they are using, clearly showing exchanges.<br><br>**34 x 5 =**<br>  <br><br>Bar modelling and number lines can support pupils when solving problems with multiplication alongside mental jottings and informal methods.<br>  <br> | Pupils initially use the grid method, before moving on to the expanded column method and the formal short multiplication column method.<br><br>$34 \times 5 = 170$<br><br>\| x \| **30** \| **4** \|<br>\| **5** \| *150* \| *20* \|<br>*150 + 20 = 170*<br><br>H T O<br>3 4<br>× 5<br>2 0 (5 × 4)<br>+ 1 5 0 (5 × 30)<br>1 7 0<br><br>H T O<br>3 4<br>× 5<br>1 7 0<br>1 2 |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Use formal written methods to multiply a 3 digit number by a 1 digit number | When moving to 3 digit by 1 digit multiplication, pupils should be encouraged to use the formal written column method with efficiency.<br><br>As this is introduced, limit the number of exchanges needed in the questions and move pupils away from resources as they gain more confidence to work abstractly. | Pupils use base 10 and place value counters, where needed, to continue to support the understanding of the written method.<br>The corresponding formal method is modelled alongside there concrete materials.<br><br>**245 x 4 =**<br>  <br><br>  <br> | Pupils represent their work with place value counters in a way that they understand.<br>They draw the counters using colour to show different amounts or draw circles in the different columns to show their thinking.<br><br>**245 x 4 =**<br>  <br><br><br>Pupils draw the grid method using base 10, where appropriate and necessary.<br><br>  <br> | Pupils demonstrate their understanding of multiplying 3 digit by 1 digit numbers using the grid method.<br>**327 x 4 =**<br>\| x \| 300 \| 20 \| 7 \|<br>\| --- \| --- \| --- \| --- \|<br>\| 4 \| 1200 \| 80 \| 28 \|<br>1200 + 80 + 28 = 1,308<br><br>Pupils transfer their understanding to the formal column written method, showing multiple exchanges.<br><br>$245 \times 4 = 980$<br><br>\| \| H \| T \| O \|<br>\| --- \| --- \| --- \| --- \|<br>\| \| 2 \| 4 \| 5 \|<br>\| x \| \| \| 4 \|<br>\| \| 9 \| 8 \| 0 \|<br>1 2 |



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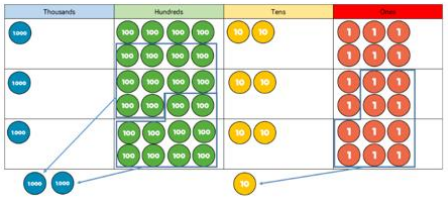
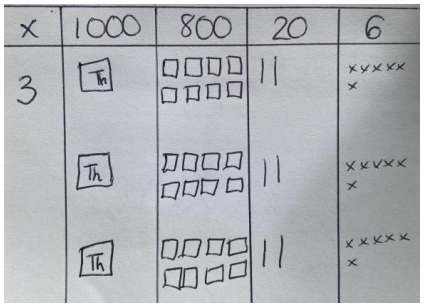
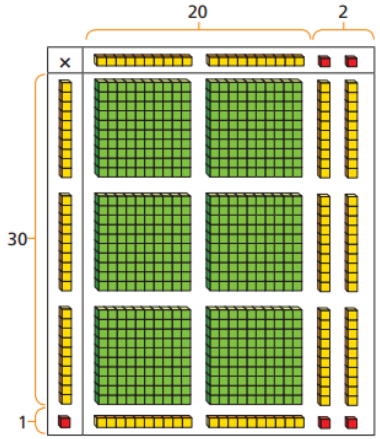
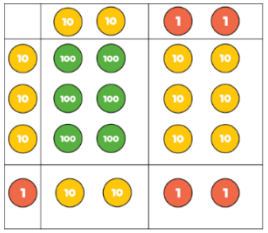
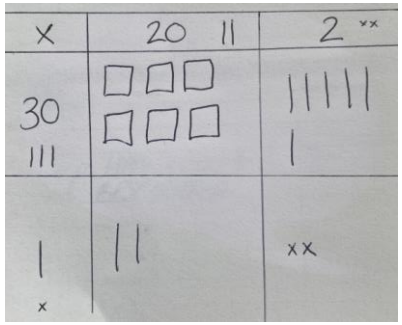
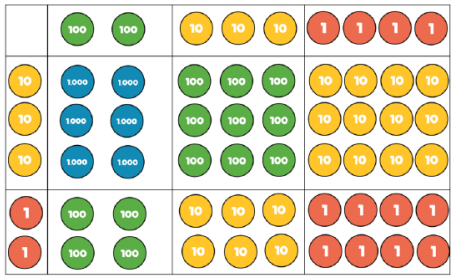
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Use formal written methods to multiply a 4 digit number by a 1 digit number | When multiplying 4-digit numbers, place value counters are the best manipulative to use to support pupils in their understanding of the formal written method.<br>If pupils are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method. | Pupils can continue to be supported by place value counters at this stage of multiplication. This is initially done where there is no regrouping.<br>Manipulatives may still be used with the corresponding multiplication modelled alongside.<br>  | Pupils can draw the grid method using base 10 and counters, where appropriate and necessary.<br>  | Pupils understand that the formal written column method for multiplication is the most efficient method for multiplying 4 digit numbers.<br>1,826 × 3 = 5,478<br>Th H T O<br>1 8 2 6<br>× 3<br>5 4 7 8<br>2 1 |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Use formal written methods to multiply a 2 digit number by a 2 digit number | When multiplying a multi-digit number by two digits, pupils use the area model to understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the base 10.<br><br>The grid method matches the area model as an initial method to work concretely and then once then understand the process they should move to the formal written method. | Pupils partition both 2-digit numbers in to tens and ones. Base ten are used to show how many tens and ones are in each column or row.<br>  <br>Pupils move to using place value counters to represent the numbers (reinforcing cardinality).<br>  | Pupils draw a grid and the manipulatives within it, if required, before moving to the formal written method.<br>  | Pupils continue to use the grid method to support problem solving.<br><br>\| × \| 20 \| 2 \|<br>\| --- \| --- \| --- \|<br>\| 30 \| 600 \| 60 \|<br>\| 1 \| 20 \| 2 \|<br><br>When completing the long multiplication method, pupils must remember the place holder, in the ones column, when multiplying the tens.<br><br>$22 \times 31 = 682$<br><br>\| \| H \| T \| O \|<br>\| --- \| --- \| --- \| --- \|<br>\| \| \| 2 \| 2 \|<br>\| × \| \| 3 \| 1 \|<br>\| \| \| 2 \| 2 \|<br>\| \| 6 \| 6 \| 0 \|<br>\| \| 6 \| 8 \| 2 \| |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Use formal written methods to multiply a 3-digit number by a 2-digit number | Pupils can continue to use the area model when multiplying a 3-digit number by a 2-digit number.<br><br>Encourage pupils to move towards the formal written method as the most efficient method for multiplication, seeing the links with the grid method. | Place value counters become the most efficient concrete resource for pupils to use, however base 10 can continue to be used to highlight the size of the numbers.<br><br>  <br><br>Pupils use formal and informal written methods and jottings, alongside the concrete, in order to record any addition that is required. | If needed, pupils draw a grid and the manipulatives within it before moving to the formal written method. | Where needed, pupils make jottings to record the total sum of the grid.<br><br>× \| 200 \| 30 \| 4<br>30 \| 6,000 \| 900 \| 120<br>2 \| 400 \| 60 \| 8<br><br>$234 \times 32 = 7{,}488$<br><br>Pupils are confident in accurately recording multiple exchanges.<br><br>Th H T O<br>2 3 4<br>× 3 2<br>4 6 8<br>$^{1}7$ $^{1}0$ 2 0<br>7 4 8 8 |



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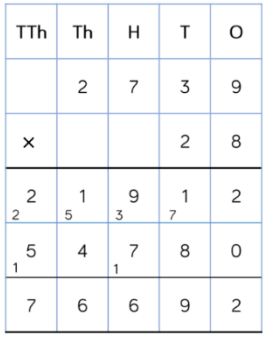
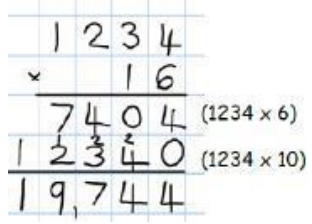
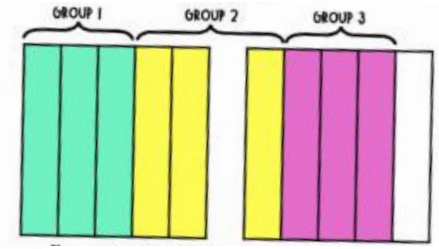
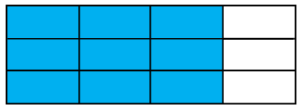
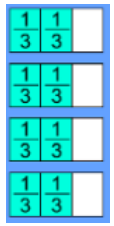
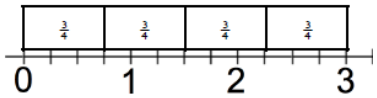
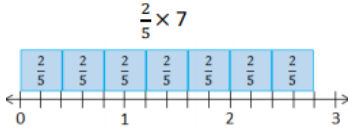
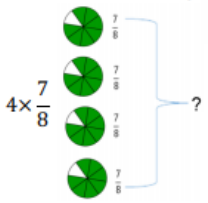
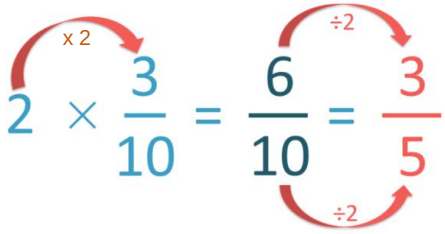
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Use formal written methods to multiply a 4-digit number by a 2-digit number<br><br>*This small step is consolidated in Year 6.* | When multiplying a 4-digit number by a 2-digit number, pupils should be confident in using the formal written column method.<br><br>If pupils are struggling with times tables, provide multiplication grids to support. This will allow pupils to reduce cognitive load and focus on how to use the method. | Pupils select appropriate manipulatives, when necessary. | Pupils draw a range of representations to support reasoning responses. | Pupils consider where exchanged digits are placed and make sure that this is consistent.<br><br>$2{,}739 \times 28 = 76{,}692$<br><br>  <br><br><br>Pupils continue to use jottings to explain each calculation within their strategy.<br><br>  <br> |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Multiply proper fractions by whole numbers | When multiplying fractions by a whole integer, pupils will need to understand why it is only the numerator that changes, whereas the denominator remains the same.<br><br>Build in opportunities to discuss misconceptions and mistakes that could occur. | Pupils use fraction towers and Cuisenaire Rods to demonstrate multiplying fractions by an integer. These strategies support bar modelling.<br><br>**3 lots of $\frac{1}{4}$ =** **2 lots of $\frac{2}{6}$ =**<br>  <br>**3 x $\frac{3}{5}$ =**<br>  | Pupils use bar models to support their understanding.<br>**3 x $\frac{3}{4}$ =**<br>  <br>**$\frac{2}{3}$ x 4 =**<br>  <br>Pupils also use a number line to show parts within a whole.<br>  <br>  <br>Pupils draw fraction wheels.<br>  | Pupils show how they have multiplied the numerator, whereas the denominator has not changed. They record their answers in the simplest form.<br>  <br>Once secure using the method with simpler fractions and whole numbers, pupils can use a more formal jotting.<br>$5 \times \frac{3}{8} = \frac{5 \times 3}{8} = \frac{15}{8}$<br>$\frac{15}{8} = 1\frac{1}{7}$ |



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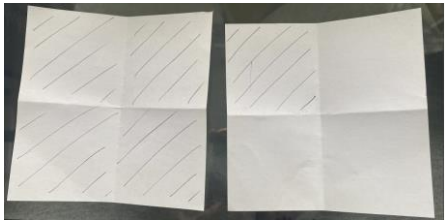
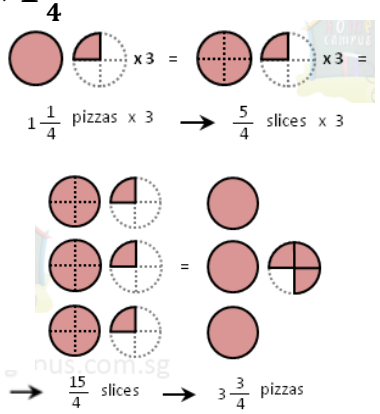
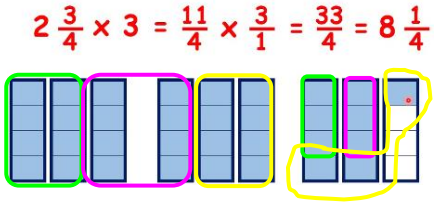
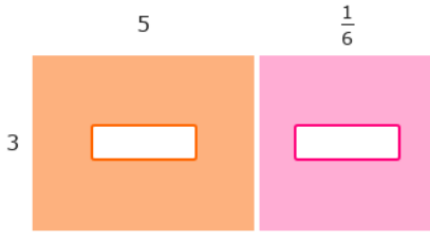
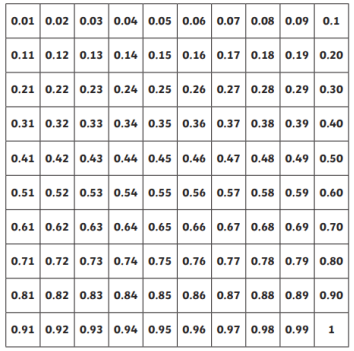
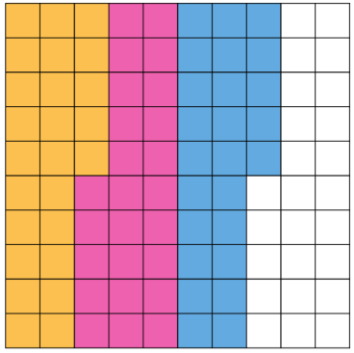
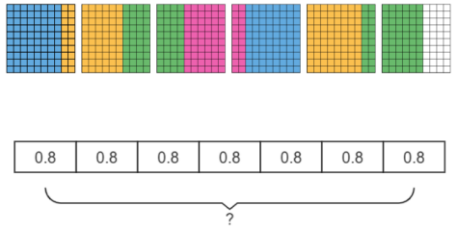
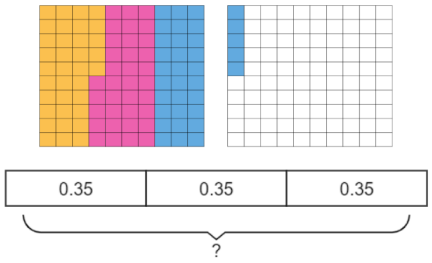
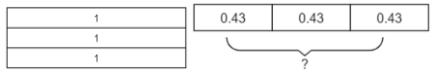
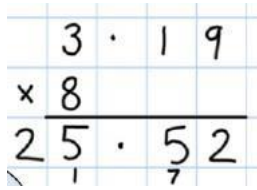
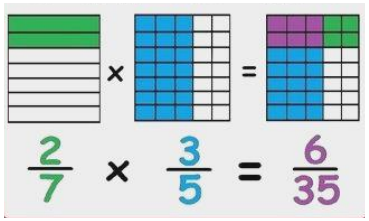
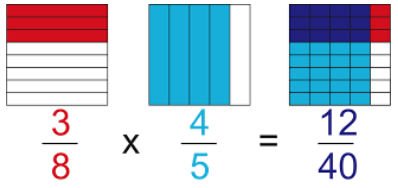
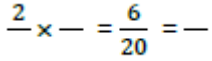
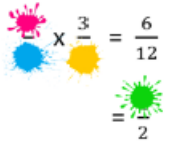
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Multiply mixed numbers by whole numbers | As before, when multiplying mixed numbers by a whole integer, pupils will need to understand why it is only the numerator that changes, whereas the denominator remains the same.<br><br>Pupils need to be confident in converting mixed numbers to improper fractions, and vice versa. | Pupils use fraction towers and make paper fraction strips to support their understanding of multiplying mixed numbers.<br><br>$3 \times 1\frac{1}{4} =$<br><br>  <br><br>$3 \times 1\frac{1}{4} = 3 \times \frac{5}{4}$ | Pupils draw their own representations, including bar models, to support them with understanding how fractions and wholes are combined, when multiplied.<br>$3 \times 1\frac{1}{4} =$<br>  <br><br><br>Pupils use bar models to show how fractions are regrouped to make new whole numbers.<br>  <br> | With simple fractions, pupils use the grid method to partition the mixed number before multiplying by the whole number.<br><br>$3 \times 5\frac{1}{6} =$<br><br>  <br><br><br>Pupils become automatic in converting mixed numbers in to improper fractions, before multiplying the numerator by the whole number.<br><br>$2 \times 1\frac{2}{3} =$<br><br>$2 \times \frac{5}{3} = \frac{10}{3} = 3\frac{1}{3}$<br><br>Pupils record answers as mixed numbers in their simplest form. |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Multiply numbers with up to 2 decimal places, by whole numbers | Pupils transfer their knowledge of place value and multiplication of whole numbers to multiplication of decimal numbers.<br><br>Pupils begin by multiplying decimals with up to 2 decimal places (numbers less than 1), before moving on to wholes and decimals with up to 2 decimal places (numbers greater than 1).<br><br>They must have a secure understanding of the value of each digit and avoid simply 'removing the decimal point'. | Pupils use decimal hundred squares, with counters or colours. This reinforces that 1 whole contains 100 hundredths.<br><br>  <br><br><br>**3 × 0.25 =**<br>  | Pupils use decimal hundred squares to support formation of bar models.<br><br>**7 x 0.8 =**<br>  <br><br><br>**3 x 0.35 =**<br>  <br><br><br>**3 x 1.43 =**<br>  <br> | Pupils know that the single digit, representing the whole number, belongs in the ones column. They line up the decimal points in the question and answer.<br><br>**3.19 x 8 =**<br>  <br><br><br>When appropriate, pupils use their knowledge of place value to make the number, that is being multiplied, 10, 100 or 1000 times bigger before multiplying; they then make the answer 10, 100 or 1000 times smaller by dividing.<br><br>$3.19 \times 8 = 25.52$<br>$319 \times 8 = 2552$ (×100, ÷100) |

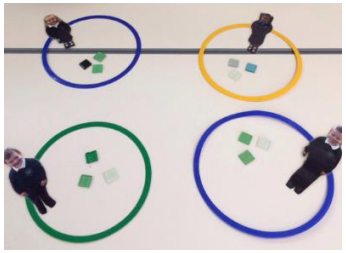
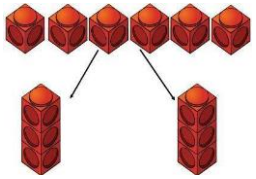
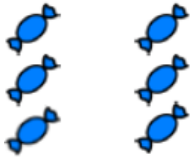
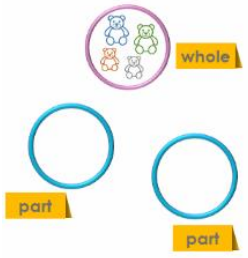
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Multiply simple pairs of proper fractions, writing the answer in its simplest form | Pupils understand that when multiplying a fraction with another fraction, both the numerators and the denominators are multiplied.<br><br>This is a change from previous learning, where the denominator has remained unchanged. | Pupils select appropriate manipulatives, when necessary. | Pupils draw diagrams to support their understanding of multiplying fractions.<br><br>Pupils combine the drawings to identify how many boxes have both colours.<br>$\frac{2}{7} \times \frac{3}{5} =$<br>  <br>$\frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$<br>$\frac{3}{8} \times \frac{4}{5} =$<br>  <br>$\frac{3}{8} \times \frac{4}{5} = \frac{12}{40}$<br>$\frac{12}{40} = \frac{3}{10}$ | Pupils multiply the numerators, then they multiply the denominators. Where needed, the answer is then simplified.<br>$\frac{3}{4} \times \frac{2}{5} = \frac{3 \times 2}{4 \times 5} = \frac{6}{20}$<br>$\frac{6}{20} = \frac{3}{10}$<br><br>Pupils use this strategy when problem solving.<br>  <br>  |

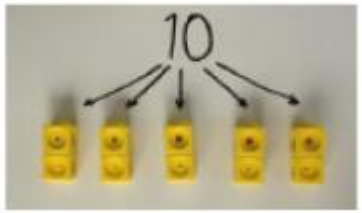
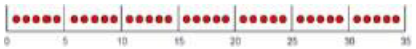
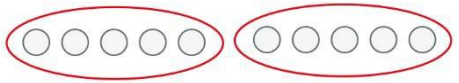
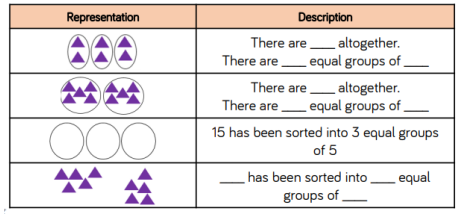
# Maths Calculations and Representations Policy

## Division

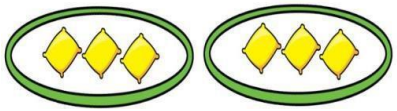
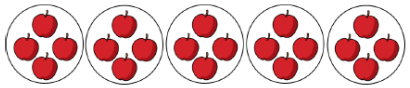
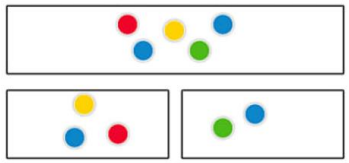
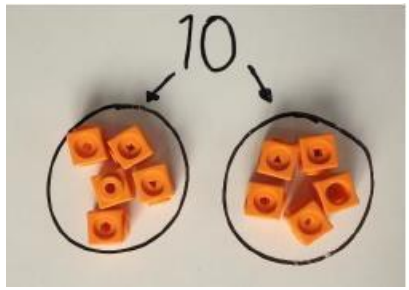
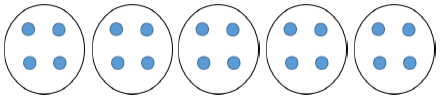
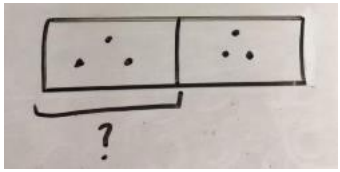
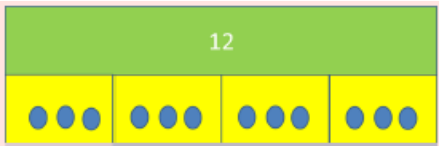
| | Guidance |
|---|---|
| **Pre-school** | Pupils are introduced to the concept of sharing through practical games and activities. They act out sharing through activities such as sharing food for a Teddy Bears' Picnic or sharing resources equally to play a game. This is reinforced by opportunities provided in the outdoor area for the pupils to share out objects such as building blocks. |

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Reception** | Share into equal groups | Pupils need to have a secure knowledge of counting backwards, number facts and subtraction in order to halve and share.<br><br>Pupils need to experience sharing using a range of objects. | Pupils share a set of objects into equal parts and work out how many are in each part.<br>  <br>  | Pupils draw or colour pictures or shapes to share quantities.<br>  <br><br>Pupils share quantities using part-whole models and bar models.<br>  | With support, pupils complete rehearsed sentence stems.<br><br>**Share 6 buns between two people.**<br><br>***'6 buns shared between two people means they get ___ buns each.'*** |

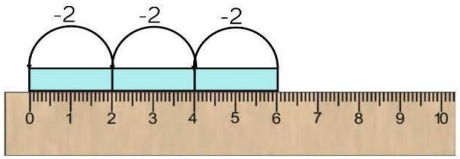
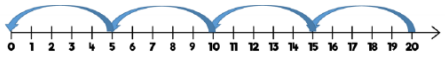
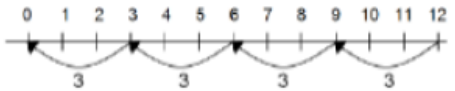
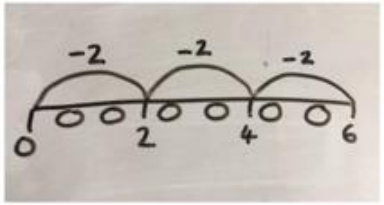
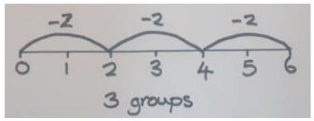
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Make equal groups | Pupils learn to make equal groups from a whole and find how many equal groups of a certain size can be made.<br><br>Pupils start with a given total and make groups of an equal amount. They record their understanding in sentences, not through formal division at this stage.<br><br>Pupils should be able to make equal groups to demonstrate their understanding of the word 'equal'. | Pupils sort a whole set of children and objects into equal groups.<br><br>  <br><br>*There are 10 children altogether.*<br>*There are 2 in each group.*<br>*There are 5 groups.*<br><br>Pupils divide quantities in to equal groups. They use cubes, counters or objects to support understanding.<br><br>  <br><br>Beadstrings reinforce the concept of equal groups.<br><br>  | Pupils represent a whole and work out how many equal groups.<br><br>  <br><br>*There are 10 in total.*<br>*There are 5 in each group.*<br>*There are 2 groups.*<br><br>Pupils can develop their understanding of equal groups by also being exposed to numbers which do not group equally.<br><br>  | With support, pupils complete rehearsed sentence stems.<br><br>***There are ___ in total.***<br>***There are ___ in each group.***<br>***There are ___ groups.***<br><br>  |

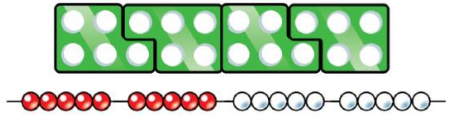
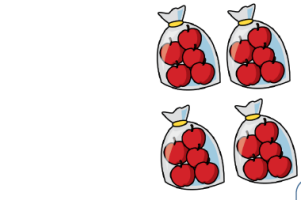
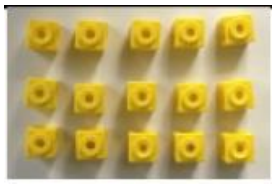
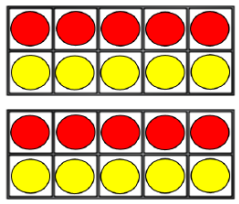
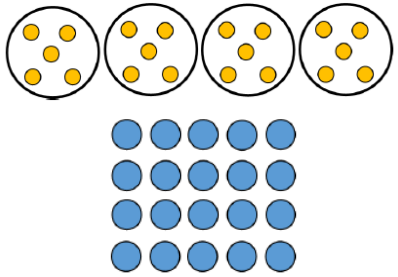
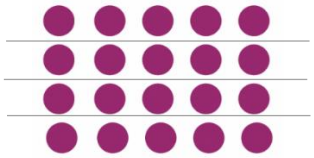
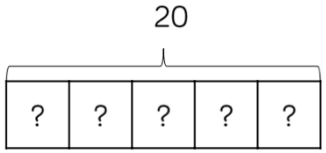
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year One** | Solve 1-step problems using sharing | Pupils solve problems by sharing objects and quantities into equal groups.<br><br>Pupils explore sharing as a model of division. They use 1 : 1 correspondence to share concrete objects into equal groups. Pupils are not expected to divide formally. | Pupils share using a range of objects.<br><br>  <br><br>  <br><br>They apply their understanding of sharing within physical bar models and part-whole models.<br><br>  <br><br>  | Pupils draw pictures or shapes to share quantities.<br><br>  <br><br>Pupils use bar modelling to show and support understanding.<br><br>**6 divided by 2 is …**<br><br>  <br><br>***A teacher shares 12 counters between 4 children. How many counters do they get each?***<br><br>  | Pupils complete sentence stems and link division with repeated addition.<br><br>***'6 shared between 2 is 3'***<br><br>***'3 + 3 + 3 + 3 is equal to 12'*** |

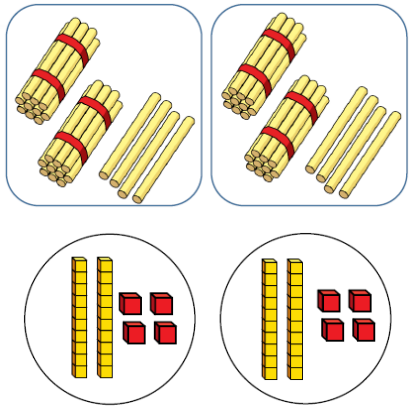
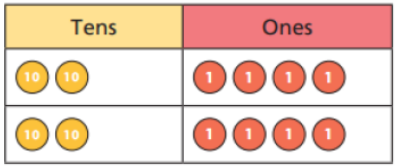
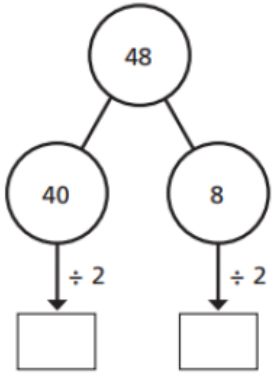
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Divide using repeated subtraction | Pupils are introduced to the division symbol. They will begin to see the link between division and multiplication.<br><br>Pupils should also be encouraged to use known times tables facts, where appropriate. | Pupils carry out repeated subtraction using Cuisenaire rods above a ruler.<br><br>**3 groups of 2**<br>  | Pupils represent repeated subtraction pictorially, using structured number lines and then creating their own.<br>  <br>Pupils show jumps in groups. They understand that the number of jumps is the number of groups.<br>  <br>  | Pupils become secure with representing division as an abstract number sentence using the division and equals symbol.<br><br>$20 \div 5 = 4$<br><br>They use an abstract number line to represent the equal groups that have been subtracted.<br><br>**6 ÷ 3 = 2**<br>  |

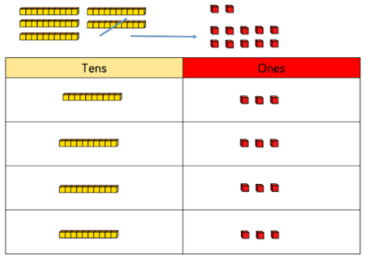
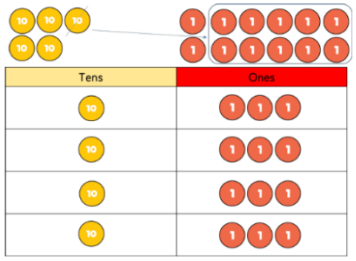
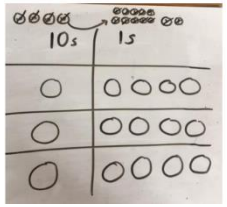
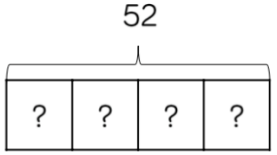
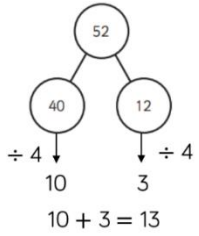
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Two** | Share grouped objects equally using arrays | Pupils solve problems by grouping and counting the number of groups.<br><br>Grouping encourages pupils to count in multiples and links to repeated subtraction on a number line. | Pupils use concrete representations in fixed groups, such as number shapes, to show the links between multiplication and division.<br>  <br>  <br>  <br>  | Pupils draw arrays once they are secure at drawing equal groups of objects.<br>  <br>Pupils draw lines to divide their arrays in to groups.<br>  <br>They represent their understanding of arrays on bar models.<br>  | Pupils focus on efficient strategies, and whether they should use grouping or sharing, depending on the context of the question.<br><br>There are 20 apples altogether.<br>They are put in bags of 5.<br>How many bags are there?<br><br>**20 ÷ 5 = 4** or **20 ÷ 4 = 5** ?<br><br>Pupils create linking number sentences to show the relationship between division and multiplication.<br><br>4 x 5 = 20 4 = 20 ÷ 5<br>5 x 4 = 20 5 = 20 ÷ 4<br>20 ÷ 4 = 5 20 = 5 x 4<br>20 ÷ 5 = 4 20 = 4 x 5 |

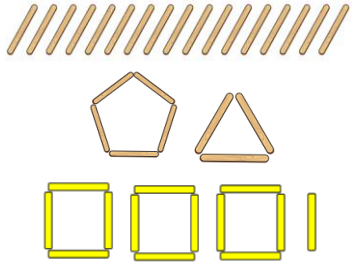
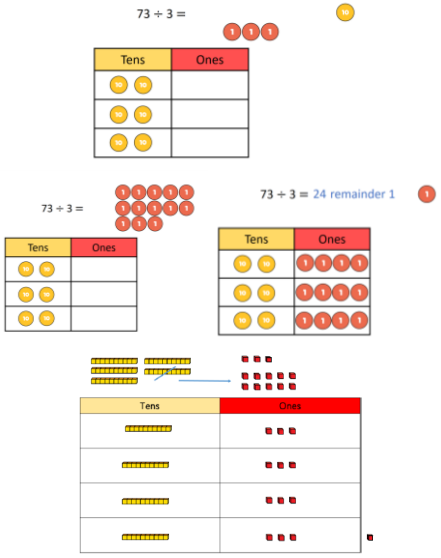
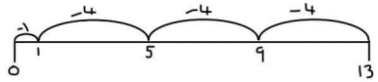
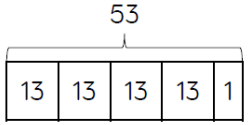
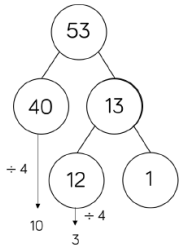
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Divide 2-digits by 1-digit, sharing with no exchange | When dividing larger numbers, pupils use manipulatives that allow them to partition into tens and ones.<br><br>They divide numbers that do not involve exchange or remainders.<br><br>It is important that pupils divide the tens first and then the ones. | Pupils use straws, base 10 and place value counters to share 2-digit numbers into equal groups.<br><br>**48 ÷ 2 =**<br>  <br>They confidently use place value grids and partitioning to support their understanding.<br>  <br> | Pupils use part-whole models, which provide them with a clear representation that matches the concrete resources.<br>  <br> | Pupils use known times-tables facts to support partitioning numbers into multiples of the divisor.<br><br>$48 \div 2 = 24$ |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Divide 2-digits by 1-digit, with exchanges - with no remainders | Pupils divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.<br><br>They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders.<br><br>Pupils use the times-tables facts that they know to partition the number into multiples of the divisor. | When dividing numbers involving an exchange, pupils use base 10 and place value counters to exchange one ten for ten ones.<br><br>Pupils should start with equipment outside the place value grid before sharing the tens and one equally between the rows.<br><br>  <br>  | Pupils represent the place value counters pictorially.<br>  <br>Pupils use bar models to demonstrate their understanding of division.<br>  <br>They use flexible partitioning, in the part-whole model, to support this method.<br>  | Pupils record their calculation within number sentences containing the division symbol.<br><br>$52 \div 4 = 13$ |

# Maths Calculations and Representations Policy

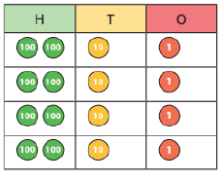
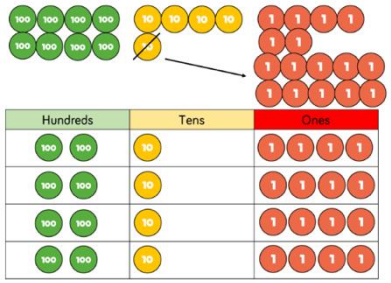
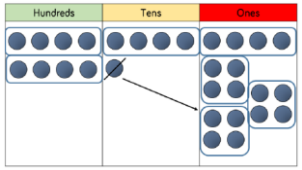
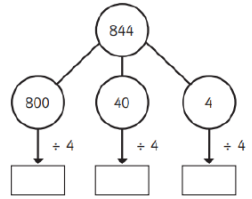
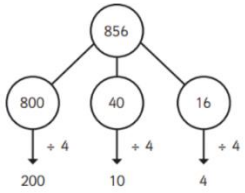
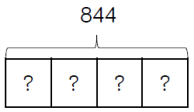
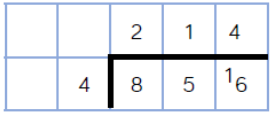
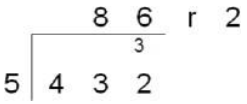
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Three** | Divide 2-digits by 1-digit, with exchanges and with remainders | Pupils develop their understanding of equal groups by also being exposed to numbers which do not group equally, within the tables that they know.<br><br>Pupils move onto solving division problems with a remainder. Links are made between division and repeated subtraction, which builds on learning in Year 2. | Pupils divide using lollipop sticks or Cuisenaire rods to form wholes.<br>  <br>Pupils use Base 10 and place value counters to exchange one ten for ten ones.<br>  | Pupils represent the lollipop sticks pictorially.<br>  <br>*'There are 3 whole squares, with 1 left over.'*<br><br>Pupils use repeated subtraction on a number line to divide.<br><br>**13 ÷ 4 =**<br>  <br>They show their understanding on bar models and part-whole models which use flexible paritioning.<br>  <br>  | Pupils record the remainders. This notation is new to Year 3 so will need a clear explanation.<br><br>**13 ÷ 4 = 3 remainder 1**<br><br>53 ÷ 4 = 13 r1 |



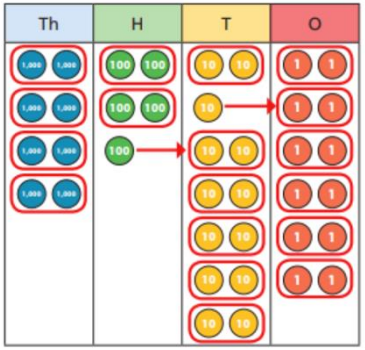
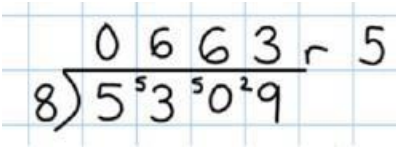
M. Underwood Sept. 2021

R. Blake Sept. 2022

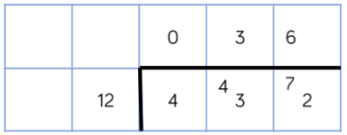
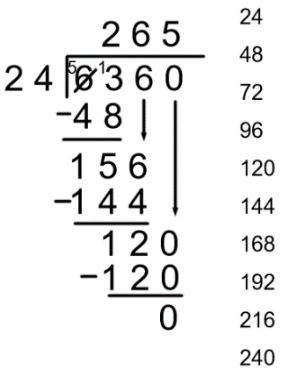
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Four** | Divide 3-digits by 1-digit, with exchanges and remainders | Pupils continue to use place value counters to share 3-digit numbers into equal groups.<br><br>Pupils start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. This method can also help to highlight remainders. | Pupils are introduced to short division, using place value counters to group and exchange.<br><br>**844 ÷ 4 =**<br>  <br><br><br>**856 ÷ 4 =**<br>  <br> | Pupils use drawn diagrams with dots or circles to help them divide numbers into equal groups.<br>  <br><br><br>Pupils use grouping and partitioning to support their understanding of short division, when dividing a 3-digit number by a 1-digit number.<br>  <br><br>  <br><br>  <br> | Pupils move towards counting in multiples in order to divide more efficiently.<br><br>**844 ÷ 4 = 211**<br><br>**856 ÷ 4 = 214**<br><br>Pupils may be introduced to short division (bus stop method) if they are ready.<br><br>When introduced, pupils begin with divisions that divide equally with no remainders.<br>  <br><br><br>They then move onto divisions with a remainder.<br>  <br> |

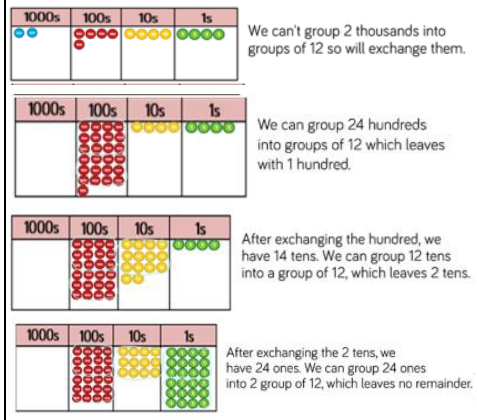
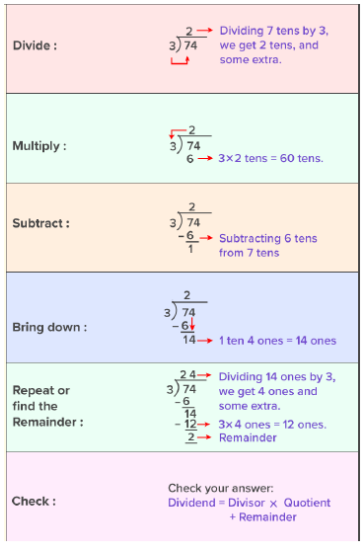
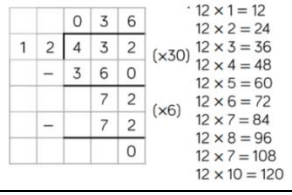
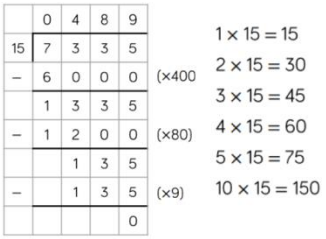
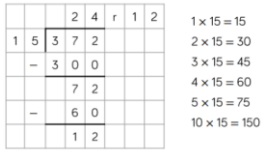
# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Five** | Divide 4-digits by 1-digits, using short division | Pupils use grouping when using the short method of division. Starting with the largest value, they group by the divisor.<br><br>Language is important: pupils should consider how many groups of tens and ones can be made. | Pupils use place value counters or plain counters, to group on a place value grid, exchanging where needed.<br>  <br><br>Pupils clearly see remainders, as there are place value counters, which are left ungrouped. | Pupils draw their own counters and group them through a more pictorial method, if needed. | Pupils move away from the concrete and pictorial when dividing numbers with multiple exchanges.<br>  <br><br>  <br> |

# Maths Calculations and Representations Policy

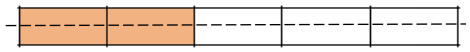
| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Divide 4-digits by 2-digits, using short division | Pupils begin to divide up to 4-digits by 2-digits selecting written methods as their most accurate method.<br><br>Pupils will also solve problems with remainders where the quotient can be rounded as appropriate. | Pupils select appropriate manipulatives, when necessary. | Pupils draw representations, as appropriate. | $432 \div 12 = 36$<br><br>  <br><br>Pupils write out multiples to support their calculations with larger remainders.<br><br>  <br><br>Pupils may record the remainder as decimals or fractions. |

# Maths Calculations and Representations Policy

| | Small Step | Guidance | Concrete | Abstract | |
|---|---|---|---|---|---|
| **Year Six** | Divide 4-digits by 2-digits, using long division | Pupils divide larger numbers using long division.<br><br>When a remainder is left at the end of a calculation, pupils can either leave it as a remainder or convert it to a fraction or decimal. This will depend on the context of the question.<br><br>Pupils can also answer questions where the quotient needs to be rounded according to the context. | Pupils use place value counters to initially support their understanding of long division; counters are used alongside the written formal method.<br><br>**2544 ÷ 12 =**<br><br>  | Pupils are introduced to the long division method using a 1-digit divisor.<br><br>  <br><br>They then apply this to smaller numbers with a 2-digit divisor.<br><br>**432 ÷ 12 = 36**<br><br>  | Pupils write out multiples first when moving on to long division with a 2-digit divisor.<br><br>**7,335 ÷ 15 = 489**<br><br>  <br><br>Pupils record the remainder as a fraction.<br><br>**372 ÷ 15 = 24 r12**<br><br>  <br><br>*'12 is $\frac{4}{5}$ of 15'*<br><br>**$372 \div 15 = 24\frac{4}{5}$** |

# Maths Calculations and Representations Policy

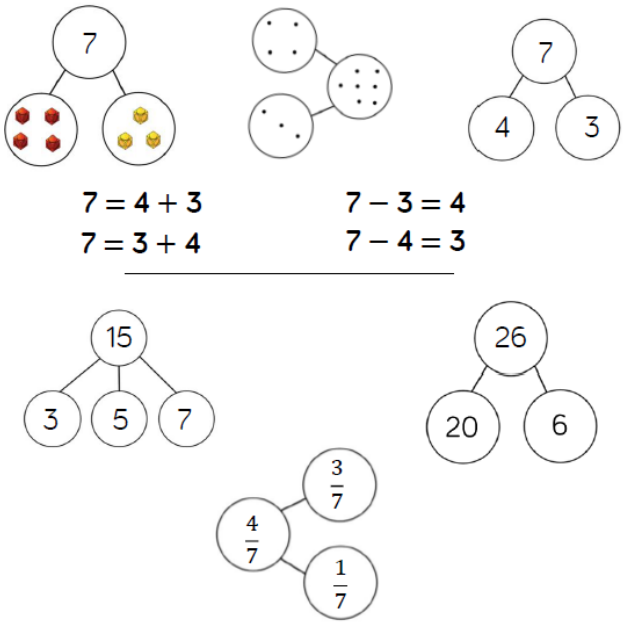
| | | | | | |
|---|---|---|---|---|---|
| | | | | | They also record decimal remainders.<br>25. 2<br>5 ) 126 . 0<br>−10<br>26<br>−25<br>1 0<br>−10<br>0 |

| | Small Step | Guidance | Concrete | Pictorial | Abstract |
|---|---|---|---|---|---|
| **Year Six** | Divide proper fractions by whole numbers | Pupils need to understand what happens to the denominator when it is divided by an integer and most importantly, why.<br>$\frac{3}{4} \div 2 = \frac{3}{8}$<br>*Why have the quarters become eighths?* | Pupils use paper strips to demonstrate what happens to a fraction when it is divided by a whole integer, *e.g. dividing by 2 = fold the paper in half.*<br>$\frac{1}{2} \div 2 =$<br>Pupils fold each half in two parts, so that it becomes clear that quarters have been formed.<br>  | Pupils use bar models and fraction diagrams to support their understanding of sharing fractions.<br>$\frac{2}{5} \div 2 =$<br>  <br>  | Pupils solve division problems involving fractions and whole numbers.<br>Solve:<br>$6 \div \_\_ = 9$<br>$\_\_ \div \frac{2}{5} = 10$<br>$\_\_ \div \_\_ = 5\frac{5}{6}$<br>Harjoht's Mum ordered pizza for the whole family. Harjoht ate ¼ of the pizza. His Mum, brother and sister ate the rest of the pizza. What fraction of the pizza did they get each? |

# Maths Calculations and Representations Policy

# Appendix 1 – Addition and Subtraction Guidance

## Part-Whole Model




### Benefits

This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.

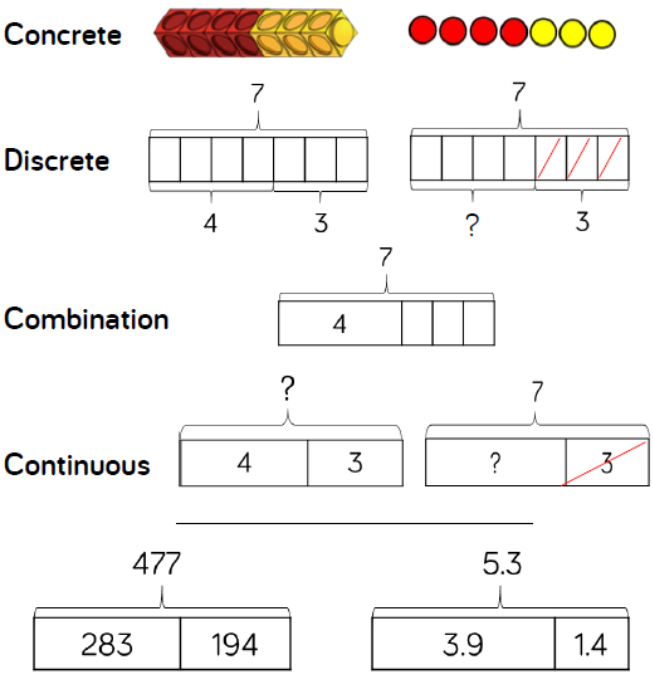
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.

Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns.

In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

## Bar Model (single)




### Benefits

The single bar model is another type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and counters can be used in a line as a concrete representation of the bar model.

Discrete bar models are a good starting point with smaller numbers. Each box represents one whole.

The combination bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

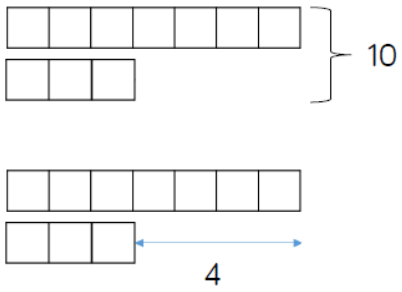
Continuous bar models are useful for a range of values. Each rectangle represents a number. The question mark indicates the value to be found.

In KS2, children can use bar models to represent larger numbers, decimals and fractions.

# Maths Calculations and Representations Policy

## Bar Model (multiple)

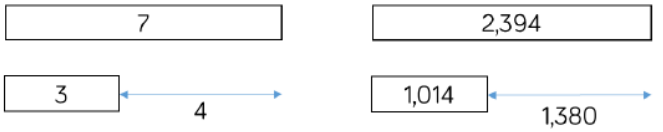
**Discrete**




$7 + 3 = 10$

$7 - 3 = 4$

**Continuous**




$7 - 3 = 4$

$2{,}394 - 1{,}014 = 1{,}380$

### Benefits

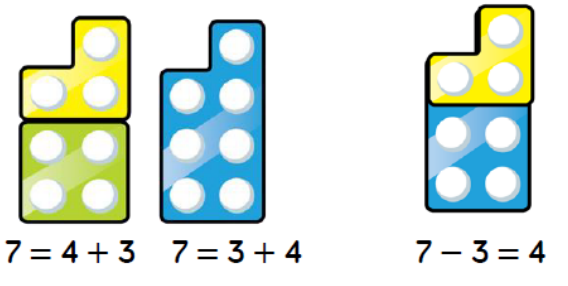
The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars. Smaller numbers can be represented with a discrete bar model whilst continuous bar models are more effective for larger numbers.

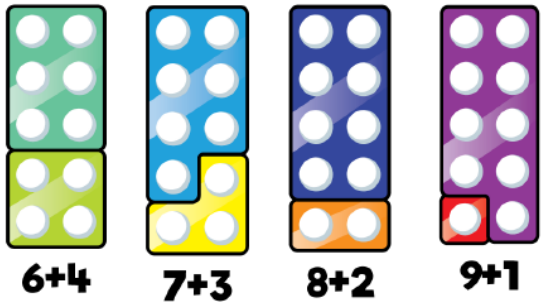
Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

When working with smaller numbers, children can use cubes and a discrete model to find the difference. This supports children to see how counting on can help when finding the difference.

## Number Shapes



$7 = 4 + 3$ $7 = 3 + 4$ $7 - 3 = 4$




### Benefits

Number shapes can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds.

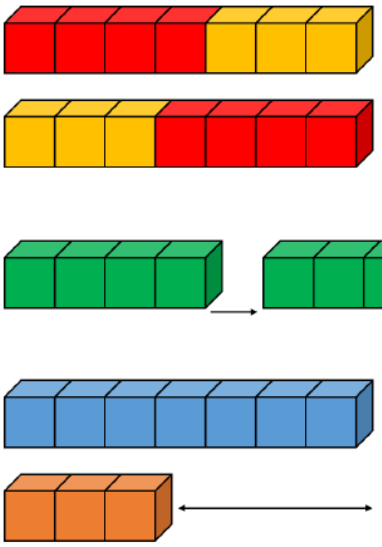
When adding numbers, children can see how the parts come together making a whole. As children use number shapes more often, they can start to subitise the total due to their familiarity with the shape of each number.

When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children can also work systematically to find number bonds. As they increase one number by 1, they can see that the other number decreases by 1 to find all the possible number bonds for a number.

# Maths Calculations and Representations Policy

## Cubes




### Benefits

Cubes can be useful to support children with the addition and subtraction of one-digit numbers.

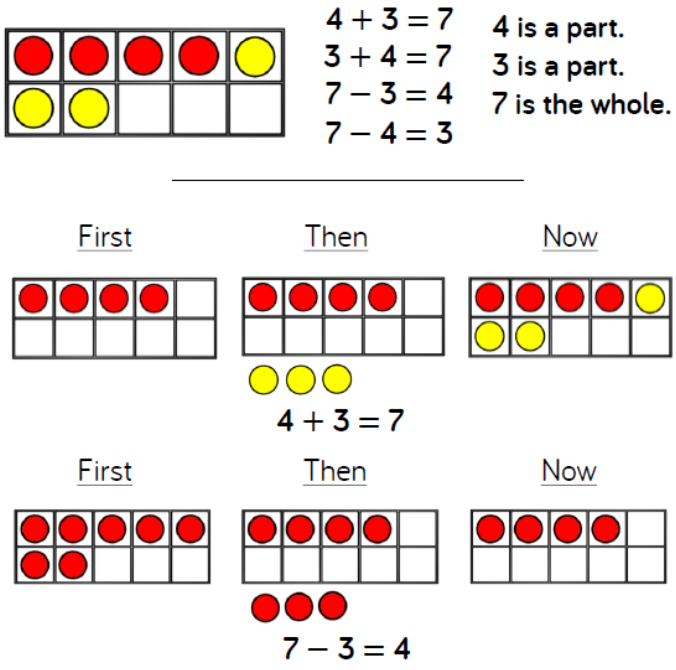
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer. This model of subtraction is reduction, or take away.

Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers.

Cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.

## Ten Frames (within 10)




### Benefits

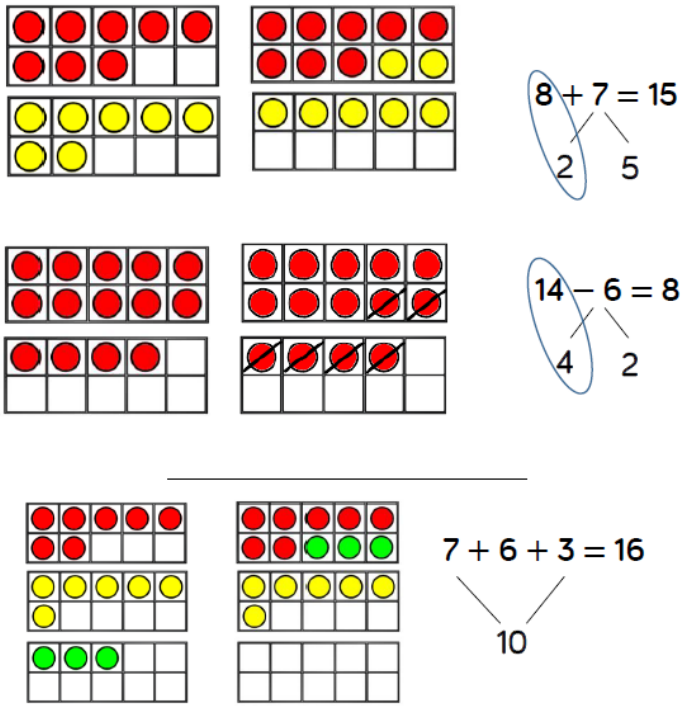
When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning.
Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number.

Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

# Maths Calculations and Representations Policy

## Ten Frames (within 20)



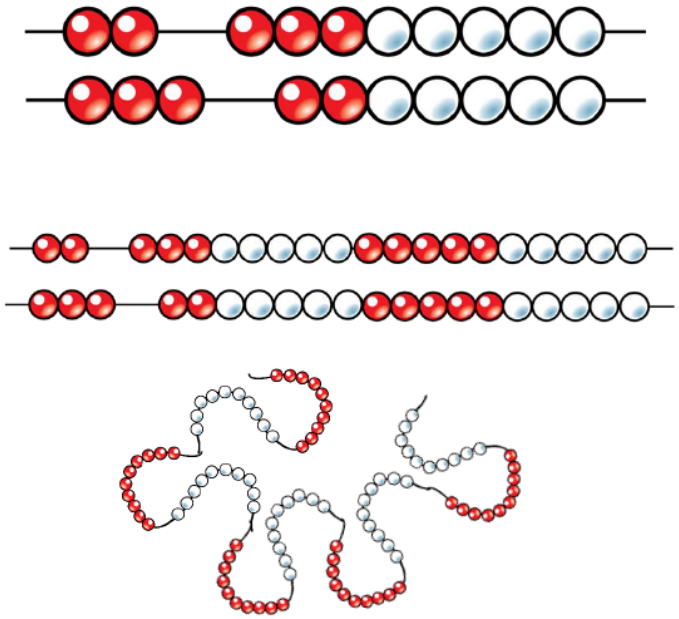

### Benefits

When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction.

When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

## Bead Strings



### Benefits

Different sizes of bead strings can support children at different stages of addition and subtraction.

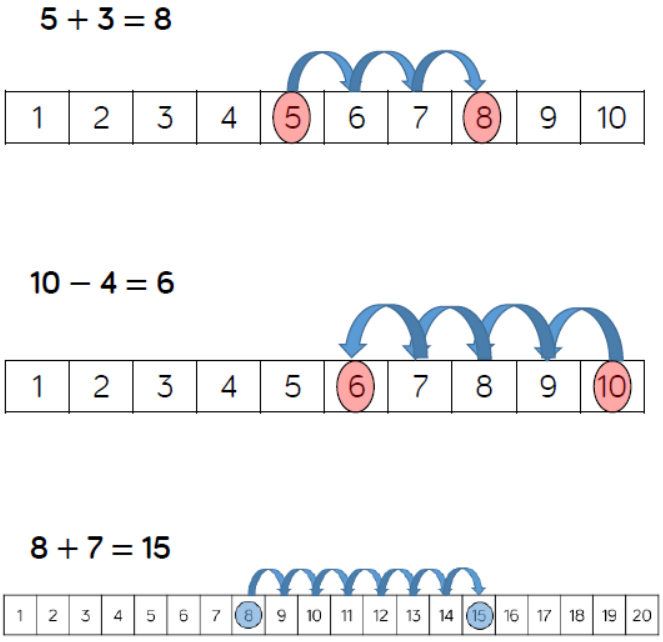
Bead strings to 10 are very effective at helping children to investigate number bonds up to 10.
They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. 2 + 8 = 10, move one bead, 3 + 7 = 10.

Bead strings to 20 work in a similar way but they also group the beads in fives. Children can apply their knowledge of number bonds to 10 and see the links to number bonds to 20.

Bead strings to 100 are grouped in tens and can support children in number bonds to 100 as well as helping when adding by making ten. Bead strings can show a link to adding to the next 10 on number lines which supports a mental method of addition.

# Maths Calculations and Representations Policy

## Number Tracks




### Benefits

Number tracks are useful to support children in their understanding of augmentation and reduction.

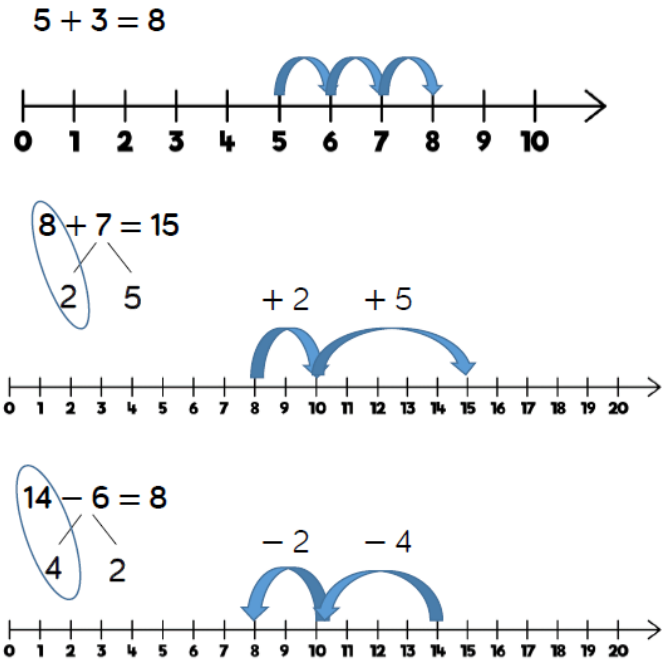
When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

When subtracting, children count back to find their answer. They start at the minuend and then take away the subtrahend to find the difference between the numbers.

Number tracks can work well alongside ten frames and bead strings which can also model counting on or counting back.

Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

## Number Lines (labelled)




### Benefits

Labelled number lines support children in their understanding of addition and subtraction as augmentation and reduction.

Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track.

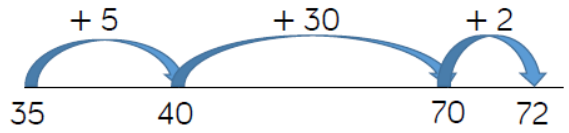
Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

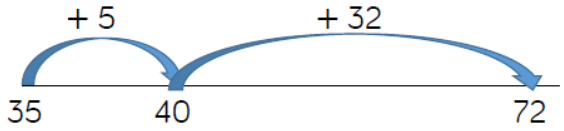
# Maths Calculations and Representations Policy

## Number Lines (blank)

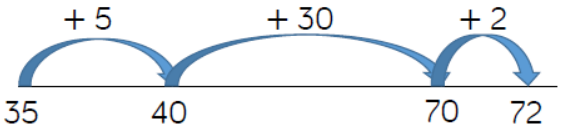
**35 + 37 = 72**




**35 + 37 = 72**




**72 – 35 = 37**




### Benefits

Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

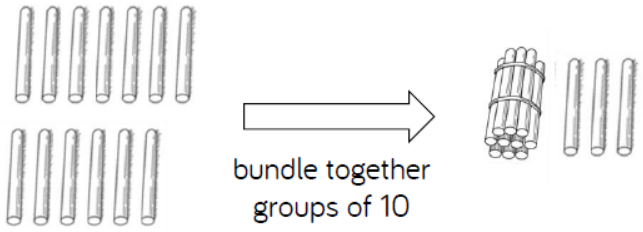
Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number.

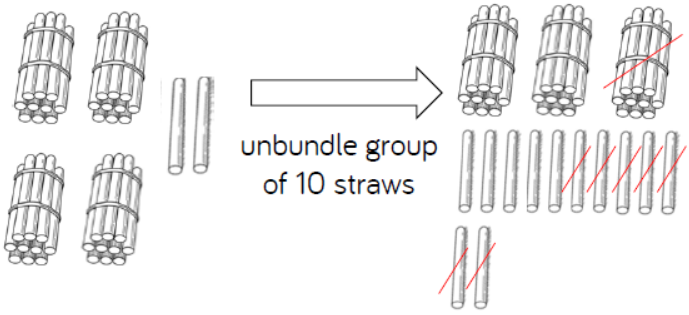
Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

## Straws

**7 + 6 = 13**




**42 – 17 = 25**




### Benefits

Straws are an effective way to support children in their understanding of exchange when adding and subtracting 2-digit numbers.

Children can be introduced to the idea of bundling groups of ten when adding smaller numbers and when representing 2-digit numbers. Use elastic bands or other ties to make bundles of ten straws.

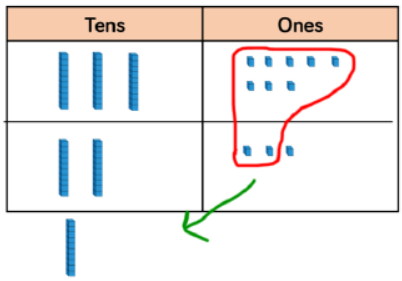
When adding numbers, children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

When subtracting numbers, children unbundle a group of 10 straws to represent the exchange from 1 ten to 10 ones.

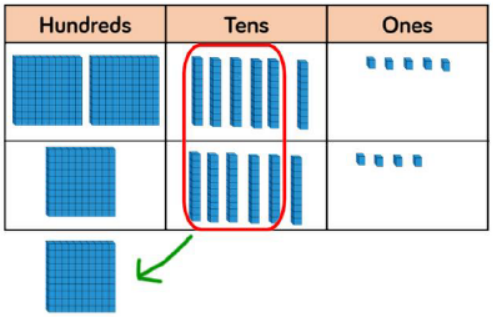
Straws provide a good stepping stone to adding and subtracting with Base 10/Dienes.

# Maths Calculations and Representations Policy

## Base 10/Dienes (addition)




$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$




$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

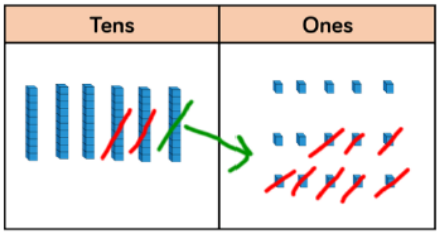
### Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

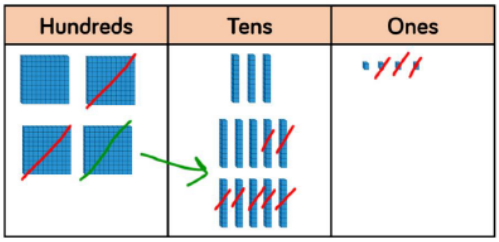
Children should first add without an exchange before moving on to addition with exchange.. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column. Here are some questions to support children.
How many ones are there altogether?
Can we make an exchange? (Yes or No)
How many do we exchange? (10 ones for 1 ten, show exchanged 10 in tens column by writing 1 in column)
How many ones do we have left? (Write in ones column)
Repeat for each column.

## Base 10/Dienes (subtraction)




$$\begin{array}{r} {}^{5}\not{6}\,{}^{1}5 \\ -\ 28 \\ \hline 37 \end{array}$$




$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}35 \\ -\ 273 \\ \hline 262 \end{array}$$

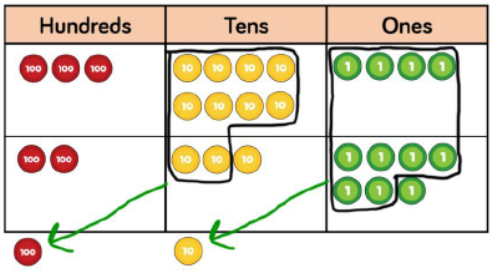
### Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

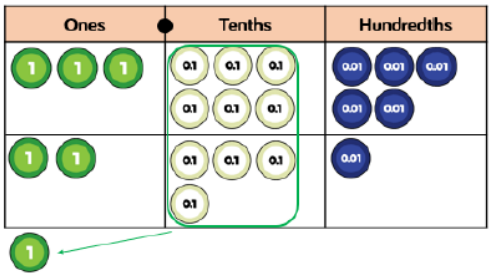
Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.
This model is efficient with up to 4-digit numbers. Place value counters are more efficient with larger numbers and decimals.

# Maths Calculations and Representations Policy

## Place Value Counters (addition)




$$\begin{array}{r} 384 \\ +\ 237 \\ \hline 621 \\ \hline 1\ \ 1 \end{array}$$




$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$$

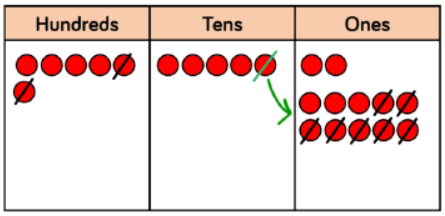
### Benefits

Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

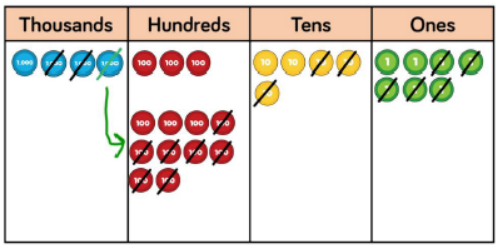
Children should first add without an exchange before moving on to addition with exchange. Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When adding money, children can also use coins to support their understanding. It is important that children consider how the coins link to the written calculation especially when adding decimal amounts.

## Place Value Counters (Subtraction)




$$\begin{array}{r} {}^{4}\cancel{6}\,{}^{1}\cancel{5}2 \\ -\ 207 \\ \hline 445 \\ \hline \end{array}$$




$$\begin{array}{r} {}^{3}\cancel{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \\ \hline \end{array}$$

### Benefits

Using place value counters is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

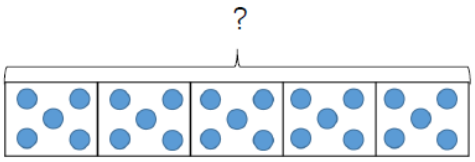
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

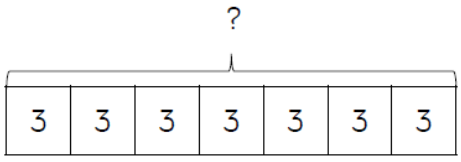
# Maths Calculations and Representations Policy

# Appendix 2 – Multiplication and Division Guidance

## Bar Model

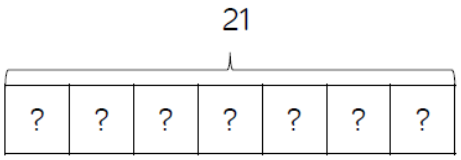



$5 \times 5 = 25$

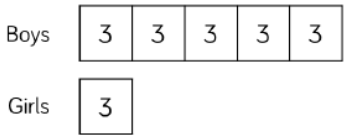



$3 \times 7 = 21$

$7 \times 3 = 21$




$21 \div 7 = 3$




### Benefits

Children can use the single bar model to represent multiplication as repeated addition. They could use counters, cubes or dots within the bar model to support calculation before moving on to placing digits into the bar model to represent the multiplication.

Division can be represented by showing the total of the bar model and then dividing the bar model into equal groups.

It is important when solving word problems that the bar model represents the problem.

Sometimes, children may look at scaling problems. In this case, more than one bar model is useful to represent this type of problem, e.g. There are 3 girls in a group. There are 5 times more boys than girls. How many boys are there?
The multiple bar model provides an opportunity to compare the groups.

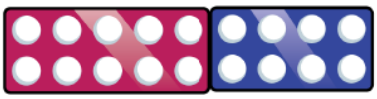
## Number Shapes

$5 \times 4 = 20$

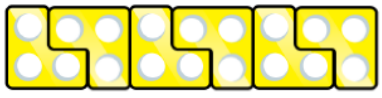
$4 \times 5 = 20$

$5 \times 4 = 20$

$4 \times 5 = 20$



$18 \div 3 = 6$



### Benefits

Number shapes support children's understanding of multiplication as repeated addition.

Children can build multiplications in a row using the number shapes. When using odd numbers, encourage children to interlock the shapes so there are no gaps in the row. They can then use the tens number shapes along with other necessary shapes over the top of the row to check the total. Using the number shapes in multiplication can support children in discovering patterns of multiplication e.g. odd × odd = even, odd × even = odd, even × even = even.

When dividing, number shapes support children's understanding of division as grouping. Children make the number they are dividing and then place the number shape they are dividing by over the top of the number to find how many groups of the number there are altogether e.g. There are 6 groups of 3 in 18.

# Maths Calculations and Representations Policy

## Bead Strings

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 3 = 5$

$5 \times 3 = 15$
$3 \times 5 = 15$

$15 \div 5 = 3$

$4 \times 5 = 20$
$5 \times 4 = 20$

$20 \div 4 = 5$

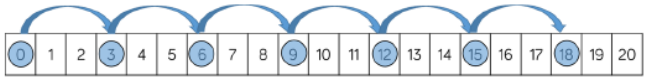
### Benefits

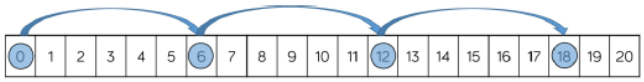
Bead strings to 100 can support children in their understanding of multiplication as repeated addition. Children can build the multiplication using the beads. The colour of beads supports children in seeing how many groups of 10 they have, to calculate the total more efficiently.
Encourage children to count in multiples as they build the number e.g. 4, 8, 12, 16, 20.

Children can also use the bead string to count forwards and backwards in multiples, moving the beads as they count.

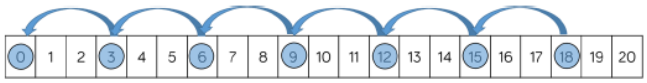
When dividing, children build the number they are dividing and then group the beads into the number they are dividing by e.g. 20 divided by 4 – Make 20 and then group the beads into groups of four. Count how many groups you have made to find the answer.

## Number Tracks




$6 \times 3 = 18$
$3 \times 6 = 18$




$18 \div 3 = 6$

### Benefits

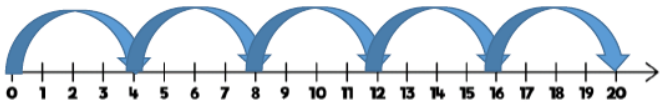
Number tracks are useful to support children to count in multiples, forwards and backwards. Moving counters or cubes along the number track can support children to keep track of their counting. Translucent counters help children to see the number they have landed on whilst counting.

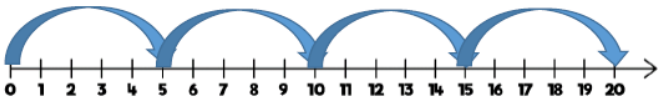
When multiplying, children place their counter on 0 to start and then count on to find the product of the numbers.
When dividing, children place their counter on the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0. Children record how many jumps they have made to find the answer to the division.

Number tracks can be useful with smaller multiples but when reaching larger numbers they can become less efficient.

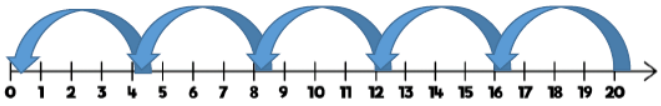
# Maths Calculations and Representations Policy

## Number Lines (labelled)




$4 \times 5 = 20$
$5 \times 4 = 20$




$20 \div 4 = 5$

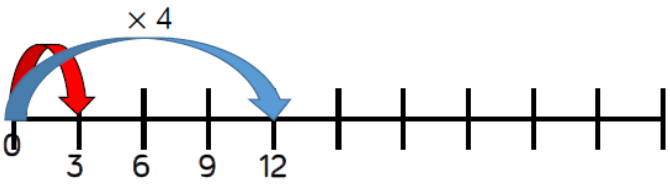
### Benefits

Labelled number lines are useful to support children to count in multiples, forwards and backwards as well as calculating single-digit multiplications.

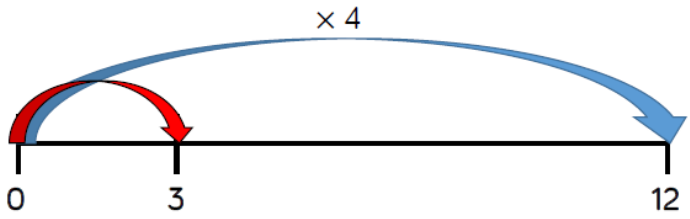
When multiplying, children start at 0 and then count on to find the product of the numbers.
When dividing, start at the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0.
Children record how many jumps they have made to find the answer to the division.

Labelled number lines can be useful with smaller multiples, however they become inefficient as numbers become larger due to the required size of the number line.

## Number Lines (blank)




A red car travels 3 miles.
A blue car 4 times further.
How far does the blue car travel?




A blue car travels 12 miles.
A red car 4 times less.
How far does the red car travel?

### Benefits

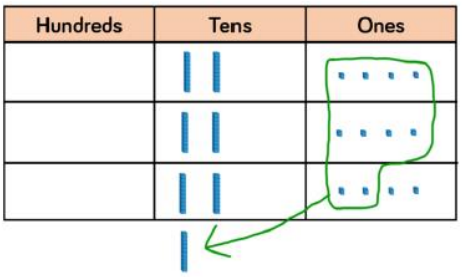
Children can use blank number lines to represent scaling as multiplication or division.

Blank number lines with intervals can support children to represent scaling accurately. Children can label intervals with multiples to calculate scaling problems.

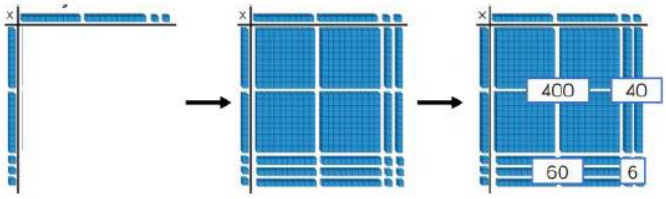
Blank number lines without intervals can also be used for children to represent scaling.

# Maths Calculations and Representations Policy

## Base 10/Dienes (multiplication)




$$\begin{array}{r} 24 \\ \times\ 3 \\ \hline 72 \\ \hline 1 \end{array}$$



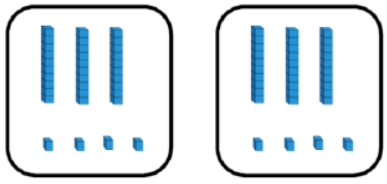

### Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written representations match.

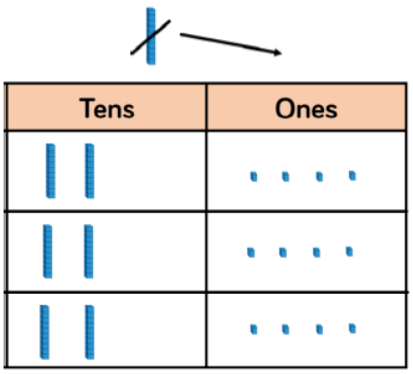
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed.

Base 10 also supports the area model of multiplication well. Children use the equipment to build the number in a rectangular shape which they then find the area of by calculating the total value of the pieces This area model can be linked to the grid method or the formal column method of multiplying 2-digits by 2-digits.

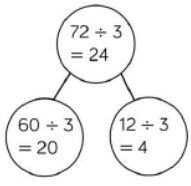
## Base 10/Dienes (division)



$$68 \div 2 = 34$$




$$72 \div 3 = 24$$




### Benefits

Using Base 10 or Dienes is an effective way to support children's understanding of division.

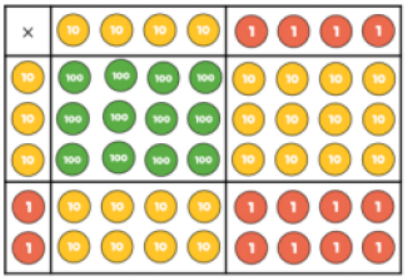
When numbers become larger, it can be an effective way to move children from representing numbers as ones towards representing them as tens and ones in order to divide. Children can then share the Base 10/ Dienes between different groups e.g. by drawing circles or by rows on a place value grid.

When they are sharing, children start with the larger place value and work from left to right. If there are any left in a column, they exchange e.g. one ten for ten ones. When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide. This will support them with mental methods.

# Maths Calculations and Representations Policy

## Place Value Counters (multiplication)


$$\begin{array}{r} 34 \\ \times\ 5 \\ \hline 170 \\ \hline 1\ 2 \end{array}$$



$$\begin{array}{r} 44 \\ \times\ 32 \\ \hline 8 \\ 80 \\ 120 \\ +\ 1200 \\ \hline 1408 \\ \hline 1 \end{array}$$

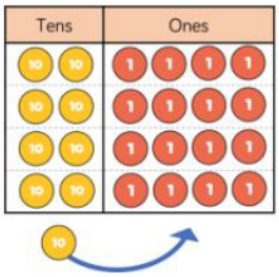
### Benefits

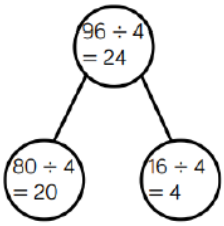
Using place value counters is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written match.

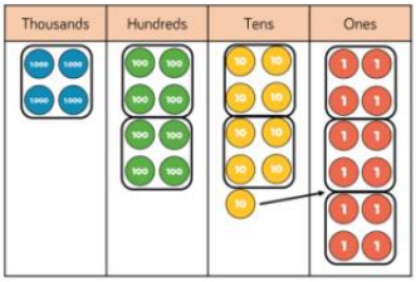
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed The counters should be used to support the understanding of the written method rather than support the arithmetic.

Place value counters also support the area model of multiplication well. Children can see how to multiply 2-digit numbers by 2-digit numbers.

## Place Value Counters (division)




$$\begin{array}{r} 1223 \\ 4\overline{)\,4892^{1}} \end{array}$$

### Benefits

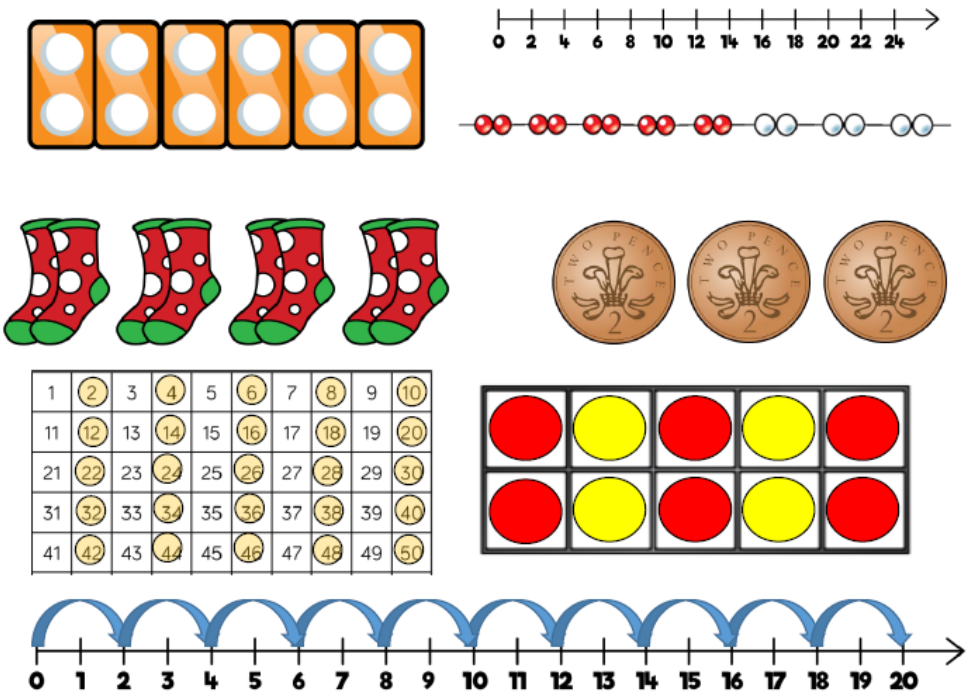
Using place value counters is an effective way to support children's understanding of division.

When working with smaller numbers, children can use place value counters to share between groups. They start by sharing the larger place value column and work from left to right. If there are any counters left over once they have been shared, they exchange the counter e.g. exchange one ten for ten ones. This method can be linked to the part-whole model to support children to show their thinking.

Place value counters also support children's understanding of short division by grouping the counters rather than sharing them. Children work from left to right through the place value columns and group the counters in the number they are dividing by. If there are any counters left over after they have been grouped, they exchange the counter e.g. exchange one hundred for ten tens.

# Maths Calculations and Representations Policy

## Appendix 3 – Times Tables

| Skill: 2 times table | Year: 2 |
|---|---|
|  | Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.<br><br>Look for patterns in the two times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones.<br><br>Use different models to develop fluency. |

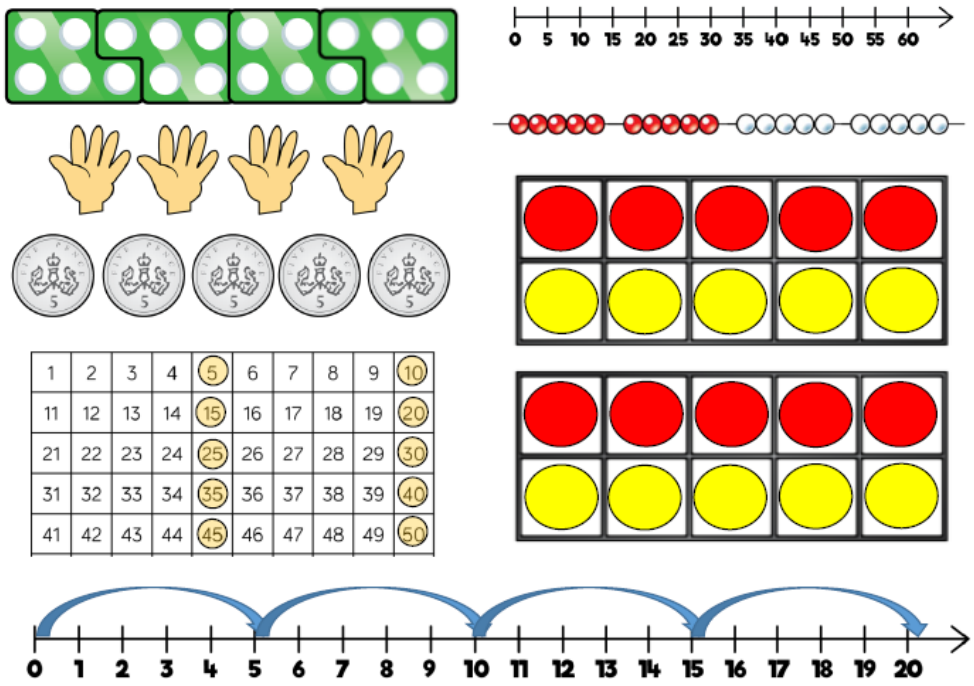
(0 × 2 = 0)
1 × 2 = 2
2 × 2 = 4
3 × 2 = 6
4 × 2 = 8
5 × 2 = 10
6 × 2 = 12
7 × 2 = 14
8 × 2 = 16
9 × 2 = 18
10 × 2 = 20
11 × 2 = 22
12 × 2 = 24

Pupils spot the pattern of 0, 2, 4, 6, 8 repeated.
Including 0 × 2, the digits 0, 2, 4, 6 and 8 repeat in the ones column: 0, 2, 4, 6, 8, 0, 2, 4, 6, 8.
The digit in the tens column goes up one each time the number string starts again.
Another rule for the 2 times table is 'count a number, miss a number, count a number, miss a number' and so on.

| | |
|---|---|
| Bar model | Ten frames |
| Number shapes | Bead strings |
| Counters | Number lines |
| Money | Everyday objects |

**2 x 3**
Two and three dropped some sticks; pick them up; they equal six.
**2 x 4**
Four and two were always late. Instead of 7:50, they showed up at 8.
Two and four were late, so was number eight.

# Maths Calculations and Representations Policy

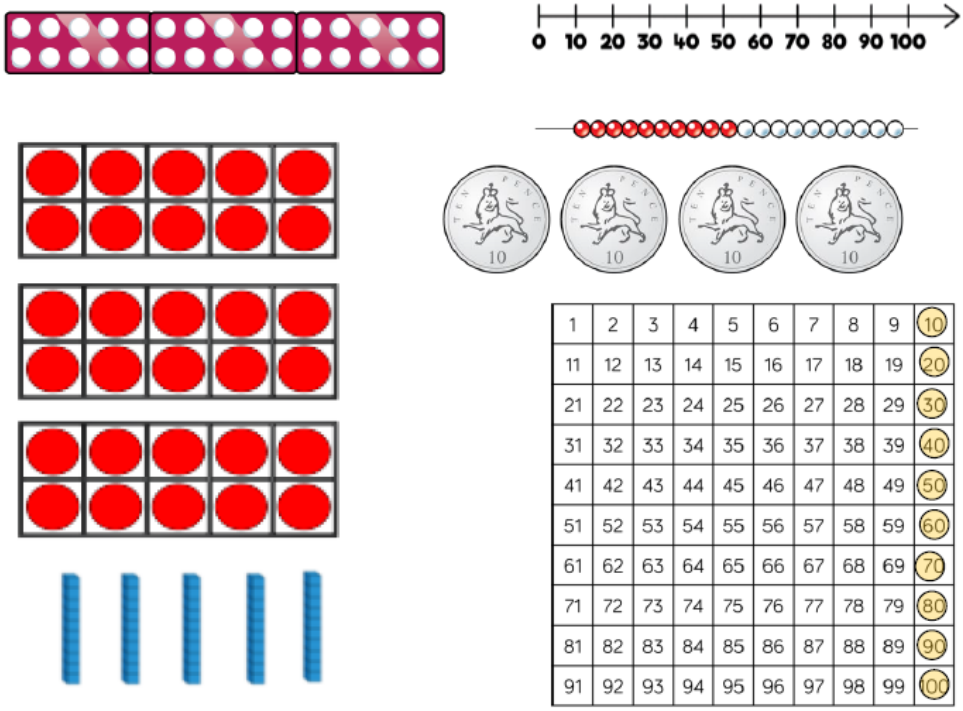
| Skill: 5 times table | Year: 2 |
|---|---|
|   | Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.<br><br>Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern. |

(0 × 5 = 0)
1 × 5 = 5
2 × 5 = 10
3 × 5 = 15
4 × 5 = 20
5 × 5 = 25
6 × 5 = 30
7 × 5 = 35
8 × 5 = 40
9 × 5 = 45
10 × 5 = 50
11 × 5 = 55
12 × 5 = 60

Pupils spot the pattern of 0, 5 repeated.
If 0 × 5 is included, the digits 0 and 5 repeat themselves in the ones column: 0, 5, 0, 5, 0, 5...
The digit in the tens column goes up by 1 each time; then, the pattern starts again.

| | |
|---|---|
| Bar model | Ten frames |
| Number shapes | Bead strings |
| Counters | Number lines |
| Money | Everyday objects |

# Maths Calculations and Representations Policy

| Skill: 10 times table | Year: 2 |
|---|---|
|   | Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.<br><br>Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits- the ones are always 0, and the tens increase by 1 ten each time. |

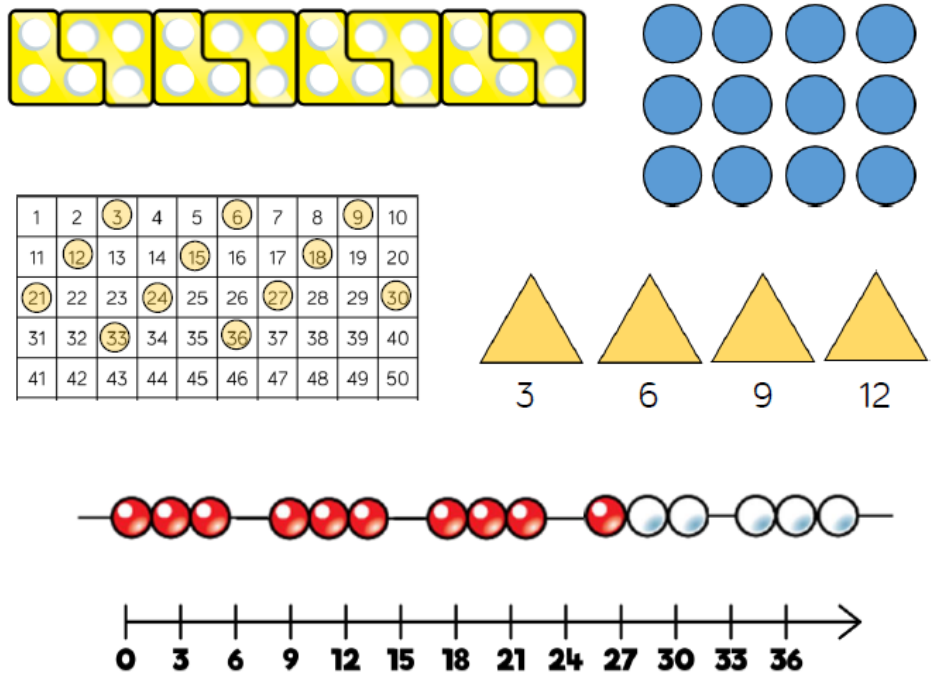
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

1 × 10 = 10
2 × 10 = 20
3 × 10 = 30
4 × 10 = 40
5 × 10 = 50
6 × 10 = 60
7 × 10 = 70
8 × 10 = 80
9 × 10 = 90
10 × 10 = 100
11 × 10 = 110
12 × 10 = 120

Pupils spot the pattern of putting a zero on the end of the number that is multiplied by 10.
This can be useful to help pupils quickly answer 10 times tables calculations, but it is important for them to understand that although it looks like a zero has just been placed on the end of the number, the digits have actually moved to the left and filled the gap with a place holder (0).

| | |
|---|---|
| Hundred square | Ten frames |
| Number shapes | Bead strings |
| Counters | Number lines |
| Money | Base 10 |

# Maths Calculations and Representations Policy

| Skill: 3 times table | Year: 3 |
|---|---|
|   | Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.<br><br>Look for patterns in the three times table, using concrete manipulatives to support. Notice the odd, even, odd, even pattern using number shapes to support. Highlight the pattern in the ones using a hundred square. |

1 x 3 = 3
2 x 3 = 6
3 x 3 = 9
4 x 3 = 12
5 x 3 = 15
6 x 3 = 18
7 x 3 = 21
8 x 3 = 24
9 x 3 = 27
10 x 3 = 30
11 x 3 = 33
12 x 3 = 33

| | | | |
|---|---|---|---|
| 03 | 06 | 09 | |
| 12 | 15 | 18 | |
| 21 | 24 | 27 | 30 |

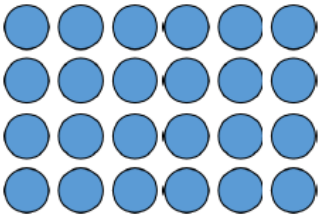
Pupils spot that the 3 times table doesn't have any rules, but there is a pattern for every ten multiples of three: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30.
The last digit of these multiples always repeats:
33, 36, … , and so on
Pupils spot patterns when the multiples of 3 are placed in a three-by-three grid. They notice that the ones and tens are consecutive, when looked at vertically.

| | |
|---|---|
| Hundred square | Bead strings |
| Number shapes | Number lines |
| Counters | Everyday objects |

**3 x 3**
Three and three are so divine, now they are the number nine.
3x3, nine cuts on my knee
**3 x 4**
One, two, three, four. One-two is three times four.
**3 x 6**
3x6, pick up 18 sticks
**3 x 7**
3x7, 21 angels in Heaven
**3 x 8**
Eight and three each had an apple core, After much eating, they had twenty-four.
Three and eight had a debate. Twenty four hours too late.

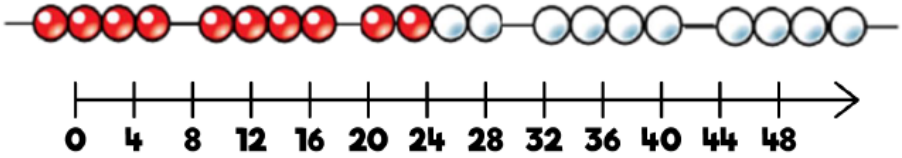
# Maths Calculations and Representations Policy

| Skill: 4 times table | Year: 3 |
|---|---|



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |


| | | | | |
|---|---|---|---|---|
| 4 | 8 | 12 | 16 | 20 |
| 24 | 28 | 32 | 36 | 40 |
| 44 | 48 | 52 | 56 | 60 |




Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the four times table, using manipulatives to support. Make links to the 2 times table, seeing how each multiple is double the twos. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

4 x 1 = 4
4 x 2 = 8
4 x 3 = 12
4 x 4 = 16
4 x 5 = 20
4 x 6 = 24
4 x 7 = 28
4 x 8 = 32
4 x 9 = 36
4 x 10 = 40
4 x 11 = 44
4 x 12 = 48

Pupils spot that there is a pattern for every ten multiples of four: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40. The last digit of these multiples always repeats: 44, 48, … , and so on
Pupils use their understanding of the 2 times table to help them identify multiples of 4.

| | |
|---|---|
| Hundred square | Bead strings |
| Number shapes | Number lines |
| Counters | Everyday objects |

**4 x 4**
Tell this to the king and queen! 4 x 4 is 16.
4x4, I heard you snore 16 times and not one more .
Want to drive a four by four truck? Unless you're 16, you're out of luck!

**4 x 5**
Four and five brought popcorn to the party, everyone said that was plenty. Someone wasn't satisfied, and that was twenty.

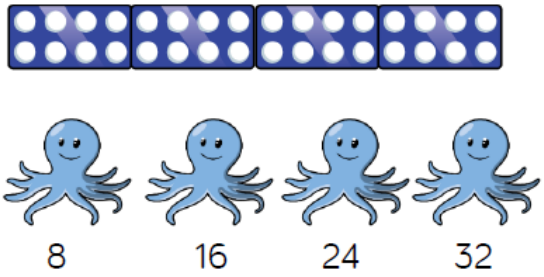
**4 x 6**
Four times six, what a bore! It's much more exciting as twenty-four.
Learn it now or your brain'll get sore! 6 x 4 is 24.
4x6, count those 24 kicks

**4 x 7**
Say it now and you'll be first-rate! 4 x 7 is 28.
4x7, 28 spiders are webbin'.
Four and seven went fishing with bait. Four times seven equals twenty-eight.

**4 x 8**
When I think of 8 I say "Achoo." 4 x 8 is 32.
4x8, 32 bluebirds on my gate.

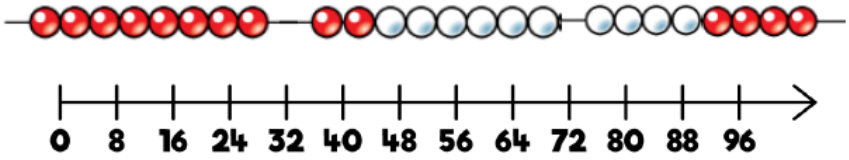
# Maths Calculations and Representations Policy

| Skill: 8 times table | Year: 3 |
|---|---|




| | | | | |
|---|---|---|---|---|
| 8 | 16 | 24 | 32 | 40 |
| 48 | 56 | 64 | 72 | 80 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |




Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the eight times table, using manipulatives to support. Make links to the 4 times table, seeing how each multiple is double the fours. Notice the pattern in the ones within each group of five multiples. Highlight that all the multiples are even using number shapes to support.

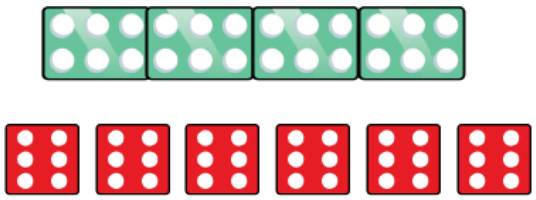

Pupils spot that the last digit of these multiples always repeat.

Pupils notice that the digits which are in the ones column are occurring in a sequence 0, 2, 4, 6, 8 from bottom to top and then repeating. While in the tens column, the numbers are increasing from top to bottom.

| | |
|---|---|
| Hundred square<br>Number shapes | Bead strings<br>Number tracks<br>Everyday objects |

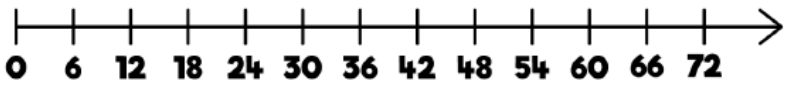
# Maths Calculations and Representations Policy

| Skill: 6 times table | Year: 4 |
|---|---|



| | | | | |
|---|---|---|---|---|
| 6 | 12 | 18 | 24 | 30 |
| 36 | 42 | 48 | 54 | 60 |
| 66 | 72 | 78 | 84 | 90 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |




Encourage daily counting in multiples, supported by a number line or a hundred square.
Look for patterns in the six times table, using manipulatives to support. Make links to the 3 times table, seeing how each multiple is double the threes. Notice the pattern in the ones within each group of five multiples.
Highlight that all the multiples are even using number shapes to support.

1x6 = 6
2x6 = 12
3x6 = 18
4x6 = 24
5x6 = 30
6x6 = 36
7x6 = 42
8x6 = 48
9x6 = 54
10x6 = 60
11x6 = 66
12x6 = 72

Pupils spot that multiples of 6 are also multiples of 2 and multiples of 3.
Pupils spot that the ones digits repeat in a pattern: 6, 2, 8, 4, 0, 6, 2, 8, 4, 0.
Pupils spot that when an even number is multiplied by 6, the last digit remains the same, e.g. 6 × 4 = 24, 6 × 6 = 36, 6 x 8 = 48.

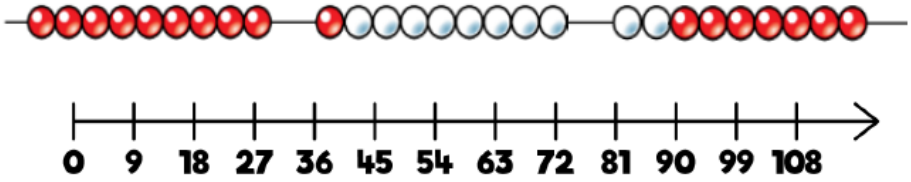
| | |
|---|---|
| Hundred square<br>Number shapes | Bead strings<br>Number tracks<br>Everyday objects |

# Maths Calculations and Representations Policy

| Skill: 9 times table | Year: 4 |
|---|---|

| | | | | |
|---|---|---|---|---|
| 9 | 18 | 27 | 36 | 45 |
| 54 | 63 | 72 | 81 | 90 |

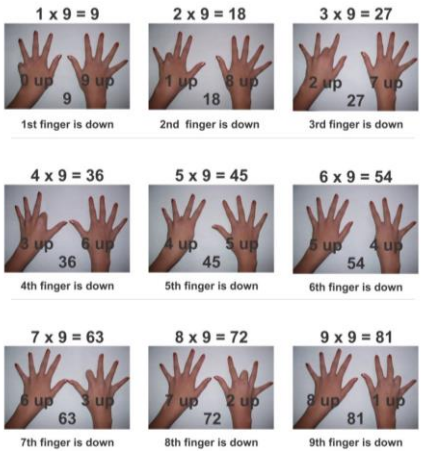
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |




Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the nine times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support as well as noting the odd, even pattern within the multiples.

1 × 9 = 09 (+1 ↓ ↓ −1)
2 × 9 = 18 (+1 ↓ ↓ −1)
3 × 9 = 27 (+1 ↓ ↓ −1)
4 × 9 = 36 (+1 ↓ ↓ −1)
5 × 9 = 45 (+1 ↓ ↓ −1)
6 × 9 = 54 (+1 ↓ ↓ −1)
7 × 9 = 63 (+1 ↓ ↓ −1)
8 × 9 = 72 (+1 ↓ ↓ −1)
9 × 9 = 81 (+1 ↓ ↓ −1)
10 × 9 = 90
blip: stays the same ↓ ↓ back to 9
11 × 9 = 99 (+1 ↓ ↓ −1)
12 × 9 = 108

Pupils spot the pattern of the ones digit goes down in ones and the tens digit goes up in ones.
(pupils notice that there's a blip at 11 × 9, but that the pattern picks up again)… '11 x 9 is 9 and 9'.
Pupils also use their fingers to identify tens and ones, up to 10 x 9.




Hundred square
Number shapes
Bead strings
Number lines

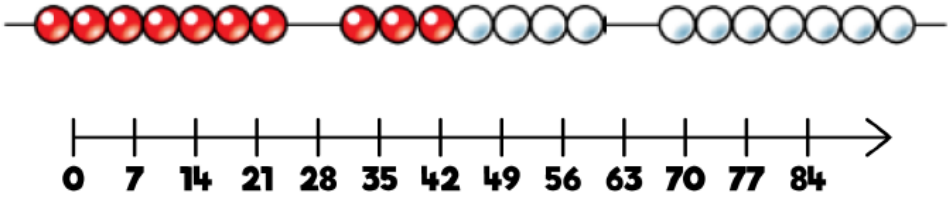

M. Underwood Sept. 2021
R. Blake Sept. 2022

# Maths Calculations and Representations Policy

| Skill: 7 times table | Year: 4 |
|---|---|

| | | | | |
|---|---|---|---|---|
| 7 | 14 | 21 | 28 | 35 |
| 42 | 49 | 56 | 63 | 70 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | (7) | 8 | 9 | 10 |
| 11 | 12 | 13 | (14) | 15 | 16 | 17 | 18 | 19 | 20 |
| (21) | 22 | 23 | 24 | 25 | 26 | 27 | (28) | 29 | 30 |
| 31 | 32 | 33 | 34 | (35) | 36 | 37 | 38 | 39 | 40 |
| 41 | (42) | 43 | 44 | 45 | 46 | 47 | 48 | (49) | 50 |
| 51 | 52 | 53 | 54 | 55 | (56) | 57 | 58 | 59 | 60 |
| 61 | 62 | (63) | 64 | 65 | 66 | 67 | 68 | 69 | (70) |
| 71 | 72 | 73 | 74 | 75 | 76 | (77) | 78 | 79 | 80 |
| 81 | 82 | 83 | (84) | 85 | 86 | 87 | 88 | 89 | 90 |
| (91) | 92 | 93 | 94 | 95 | 96 | 97 | (98) | 99 | 100 |




Encourage daily counting in multiples both forwards and backwards, supported by a number line or a hundred square.
The seven times table can be trickier to learn due to the lack of obvious pattern in the numbers, however they already know several facts due to commutativity.
Children can still see the odd, even pattern in the multiples using number shapes to support.

1x7 = 7 2x7 = 14 3x7 = 21
4x7 = 28 5x7 = 35 6x7 = 42
7x7 = 49 8x7 = 56 9x7 = 63
10x7 = 70 11x7 = 77 12x7 = 84

| | |
|---|---|
| Hundred square | Bead strings |
| Number shapes | Number lines |

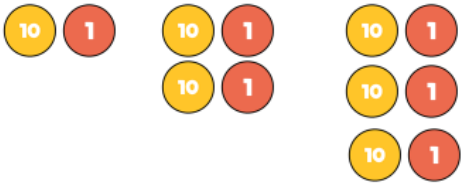
Pupils understand that the 7 times table is the hardest to learn because 7 is a prime number, and so the final digit does not repeat itself until 10 x 7.
However, when written in order in three columns, pupils spot that the ones digits are consecutive for every third multiplication fact. This occurs up until 10 x 7.

Wakey, wakey
Rise and shine
Seven sevens
Are Forty Nine

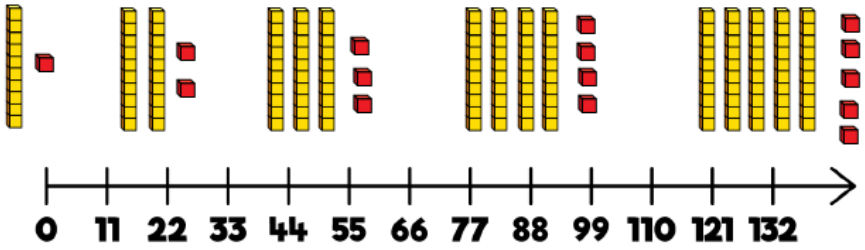
# Maths Calculations and Representations Policy

| Skill: 11 times table | Year: 4 |
|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 11 | 22 | 33 | 44 | 55 | 66 |
| 77 | 88 | 99 | 110 | 121 | 132 |




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |




Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the eleven times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support. Also consider the pattern after crossing 100

11 x 1 = 11
11 x 2 = 22
11 x 3 = 33
11 x 4 = 44
11 x 5 = 55
11 x 6 = 66
11 x 7 = 77
11 x 8 = 88
11 x 9 = 99
11 x 10 = 110
11 x 11 = 121
11 x 12 = 132

Pupils spot the symmetry of the 11 times table – at least up to 9 x 11.

When 11 is multiplied by any 1-digit number, the product of that number is written twice.

Pupils spot that when a 2-digit number is multiplied by 11, if the sum of the digits of the 2-digit number is placed between the digits of the two-digit number, it creates the answer. For example, 11 x 12: the sum of 1 and 2 = 3. 3 is placed between 1 and 2 to make 132.

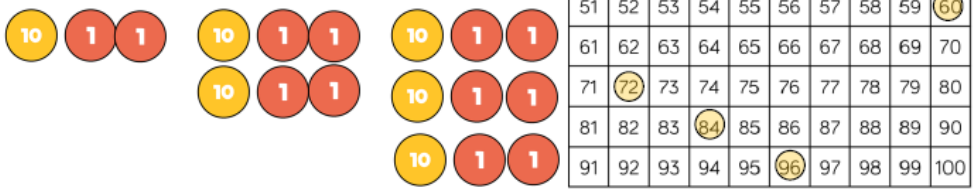
| | |
|---|---|
| Hundred square | Place value counters |
| Base 10 | Number lines |

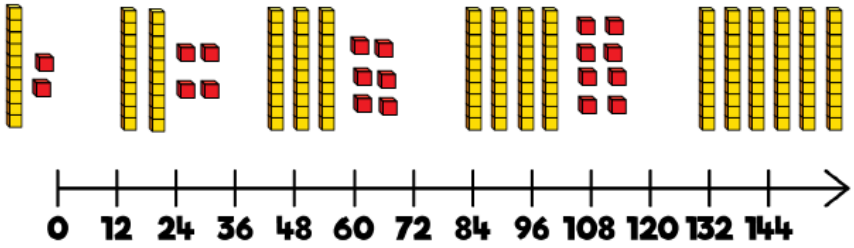
# Maths Calculations and Representations Policy

| Skill: 12 times table | Year: 4 |
|---|---|

| | | | | |
|---|---|---|---|---|
| 12 | 24 | 36 | 48 | 60 |
| 72 | 84 | 96 | 108 | 120 |
| 132 | 144 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |




Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 12 times table, using manipulatives to support. Make links to the 6 times table, seeing how each multiple is double the sixes. Notice the pattern in the ones within each group of five multiples. The hundred square can support in highlighting this pattern.


Pupils spot that there is a pattern for every five multiples of twelve: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120. The last digit of these multiples always repeat, which means that pupils can remember these digits to help them with the 12 times table.

Pupils spot that the digits, which are in the ones column, are occurring in a sequence 2, 4, 6, 8, 0, which then repeat. While in the tens column, the digits are increasing from top to bottom, skipping the numbers 5 and 11.

| | |
|---|---|
| Hundred square<br>Base 10 | Place value counters<br>Number lines |