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.

How should this policy be used?

This policy has been designed to support the teaching and planning of mathematics. The policy only details the strategies and teachers must plan opportunities for pupils to apply these. The examples and illustrations are not exhaustive but provide an overall picture of what mathematics should look like. This is not a scheme of work and must be used in conjunction with our curriculum documents.

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.

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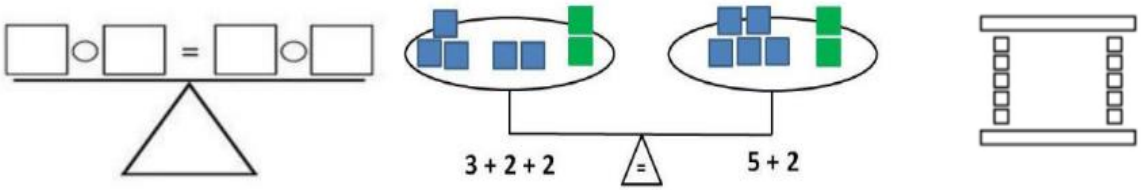
Teaching Equality

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

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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.

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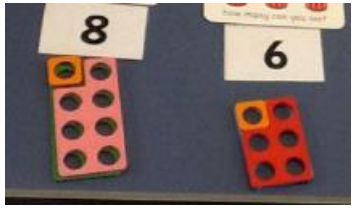
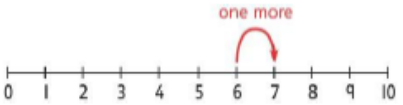
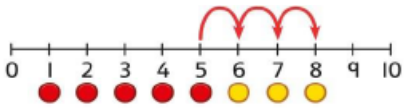
Addition

	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. 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. 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.  *One more than 4 is 5.* 	Following modelling, pupils use a number line to support their understanding of adding one more by counting on. **6 + 1 =**  *One more than 6 is 7.* *7 is one more than 6.* **5 + 3 =** 	Adults support pupils in recording their addition sums in written form. **3 + 2 = 5** *'3 add 2 equals 5. We have got 5 altogether.'*

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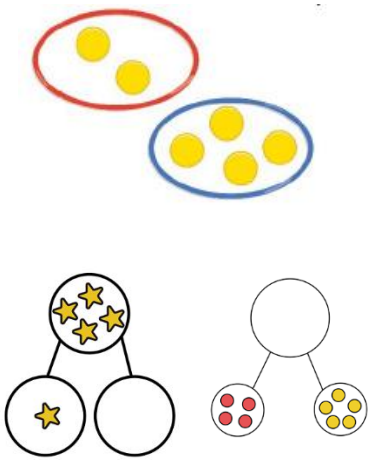
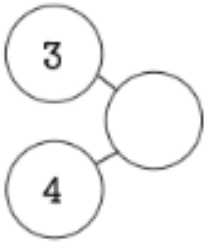
	Small Step	Guidance	Concrete	Pictorial	Abstract
Reception	Understanding part - part - whole relationships	Pupils sort and split groups using modelled stem stences to develop their understanding of parts and wholes.	Pupils sort children and objects in to groups; they understand that these are parts and that together they make the whole.  *'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. 	Pupils use partially completed part-whole models to represent the numbers. 

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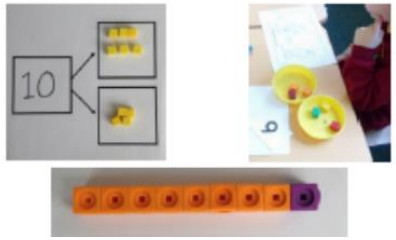
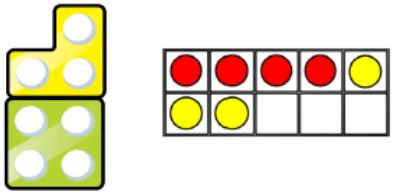
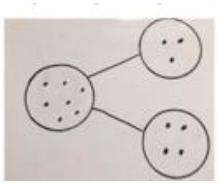
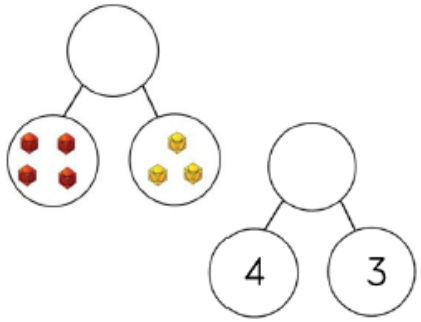
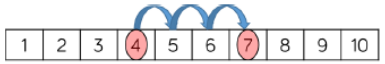
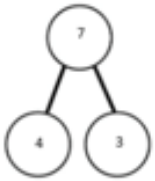
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year One	Combine two parts to make a whole	When adding numbers to 10, pupils can explore both aggregation and augmentation. Part- whole models, bar charts, number shapes and tens frames support aggregation. Tens frames, bead strings and number tracks support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

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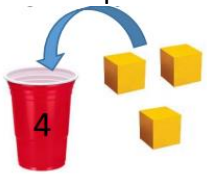
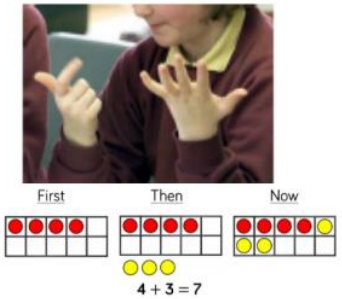
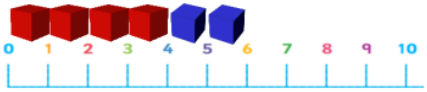
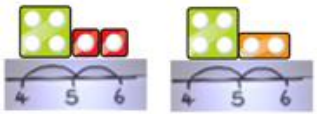
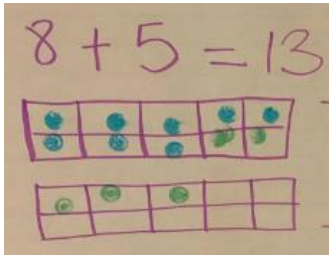
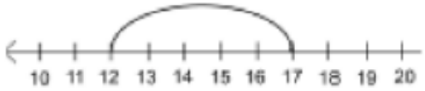
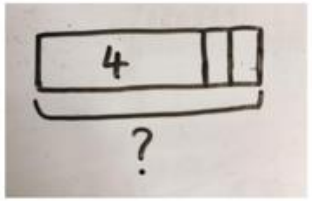
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year One	Start at the bigger number and count on, using cubes, Numicon and counters	Counting on from the biggest number is an opportunity to introduce the commutativity of addition.	Pupils count on using cubes and cups.  They count on using fingers and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

M. Underwood Sept. 2021

R. Blake Sept. 2022

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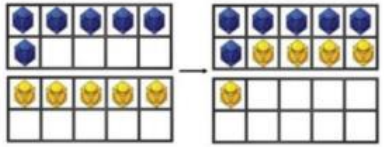
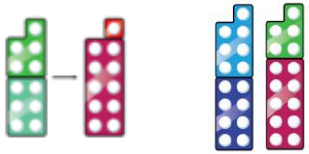
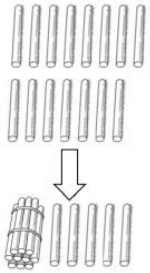
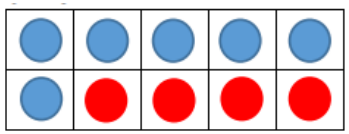
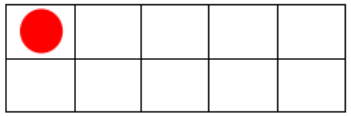
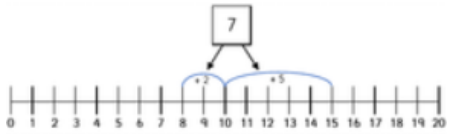
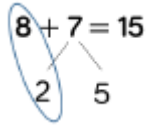
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year Two	Add by making 10	When adding one digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Use concrete resources alongside number lines to support pupils in understanding how to partition their jumps.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

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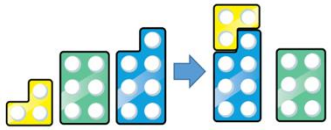
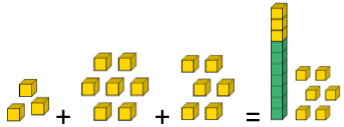
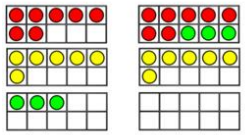
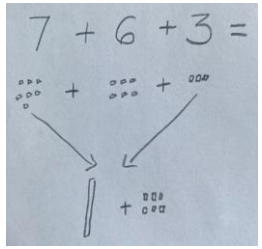
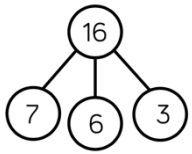
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year Two	Adding three single digits, crossing 10	When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling ten.	Pupils add three single digits using Numicon or counters on tens frames.  Pupils add three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

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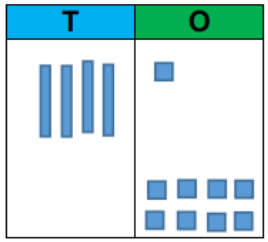
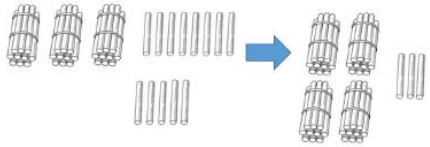
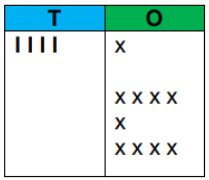
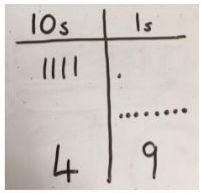
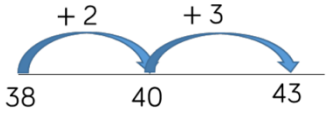
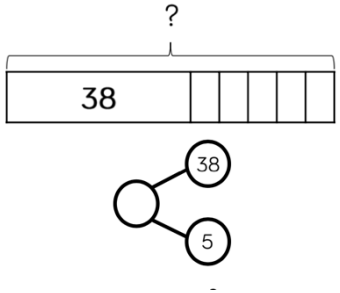
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year Two	Add 1 digit and 2 digit numbers to 100	When adding single digits to a two-digit number, pupils should be encouraged to count on from the larger number. They should apply their knowledge of number bonds to show efficiency. Hundred squares and straws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

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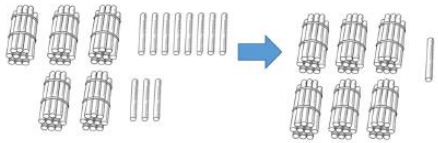
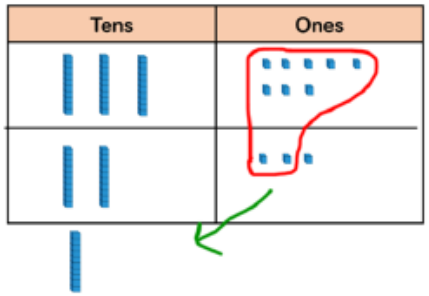
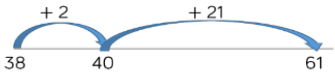
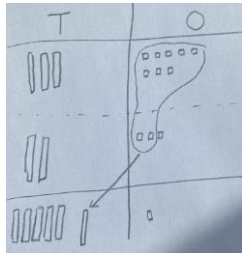
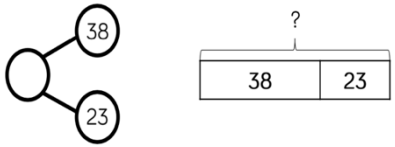
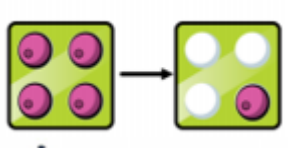
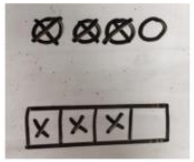
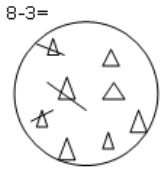
	Small Step	Guidance	Concrete	Pictorial	Abstract
Year Two	Add two 2-digit numbers, to 100	Encourage pupils to count on using manipulatives. This may bridge the tens boundary. Pupils may exchange using manipulatives but do not need record this in a formal method. Encourage them to jump to multiples of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

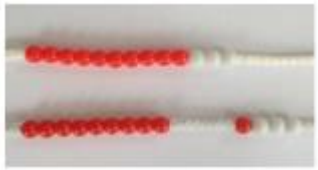
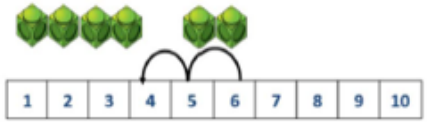
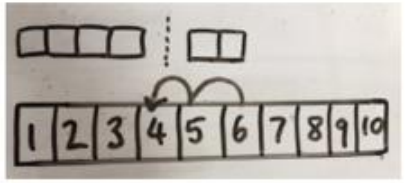
Maths Calculations and Representations Policy

Subtraction

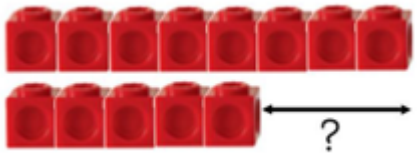
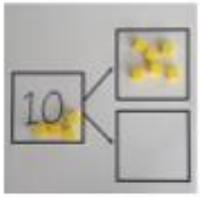
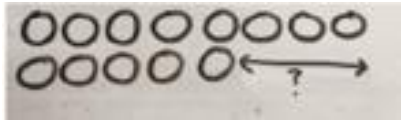
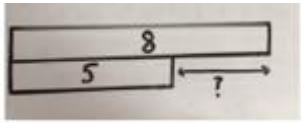
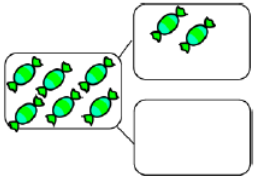
Pre-school	Guidance
	Before subtraction can be introduced, pupils need to have a secure knowledge of number. In pre-school, pupils are introduced to the concept of counting backwards through child-initiated games such as acting out counting songs and running races, *e.g. pupils shouting "5,4,3,2,1,0 - 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). 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. **4 – 3 =**  **6 – 1 =**  *1 less than 6 is 5.* *6 subtract 1 is 5.*	Pupils match images and drawings that are the same as their subtraction number sentence/story.   Pupils say one less using a number track to support their counting.  	Adults support pupils in recording their subtractions in written form. **5 – 3 = 2** *'5 take away 3 equals 2. We have got 2 left.'*

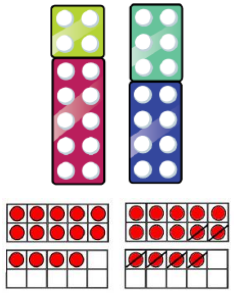
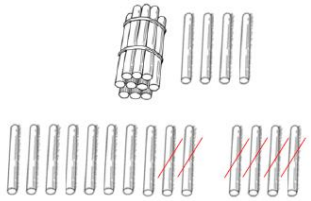
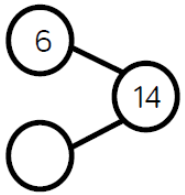
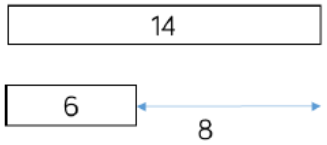
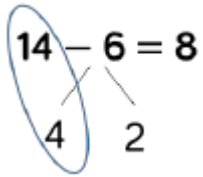
Maths Calculations and Representations Policy

	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.  Pupils use counters or cubes and move them away from the group, counting backwards as each one is moved away. 	Pupils count back using number lines or number tracks.  Pupils represent what they see using drawings.  	**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. 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. **Calculate the difference between 8 and 5:**  Pupils use the part-whole model to help explain the inverse relationship between addition and subtraction. **10 – 6 =**  	Pupils draw the concrete objects, which they have used.  Pupils use a bar model to illustrate what they need to calculate.  Pupils draw objects within a part-whole model. **6 – 2 =** 	Pupil transfer their understanding to missing box problems and reasoning questions. **8 – 5 =** The difference is ☐ **9 – 6 =** **8 – 5 =** **7 – 4 =** Why do these calculations have the same difference? Pupils move to using numbers within a part-whole model. 

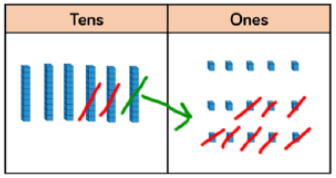
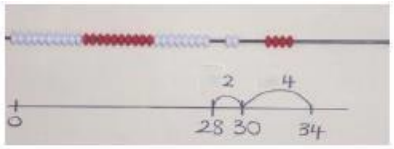
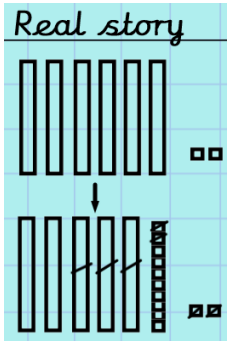
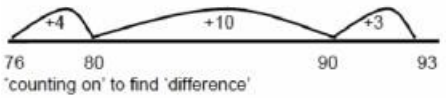
Maths Calculations and Representations Policy

	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. 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. **14 – 6 =**  Pupils demonstrate exchanging a bundle of ten straws for ten individual straws.  Pupils physically move counters on a number track to count back. 	Part-whole models, bar models and number lines support pupils understanding of subtraction.   Pupils show their understanding of partitioning using a number line. 	Pupils demonstrate the mental strategy of partitioning using heir knowledge of number bonds.  *'14 – 6 is the same as 14 – 4 – 2.* *14 – 4 = 10* *10 – 2 = 8'* **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. **34 – 13 =** 	Pupils move on to using jottings and they represent the base ten pictorially. **43 – 21 =**  Where appropriate, pupils use number lines to count back in multiples. **75 – 30 =**  *'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. 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. 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. **65 – 25 =**  Pupils use a bead string to count on to the next ten and then the rest. **34 – 28 =**  *'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.  Pupils use a number line to count on to the next ten and then the rest.  'counting on' to find 'difference'	Pupils start to record subtraction using expanded methods. **65 – 38 =** 15 – 8 = 7 50 – 30 = 20 **65 – 38 = 27**

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.

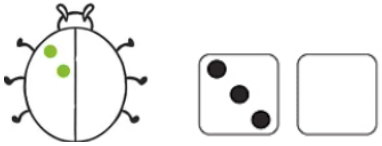
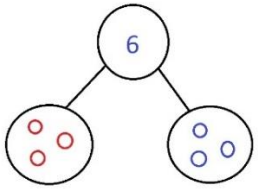
Scaling – Enlarging or reducing a number by a given amount, called the scale factor

Maths Calculations and Representations Policy

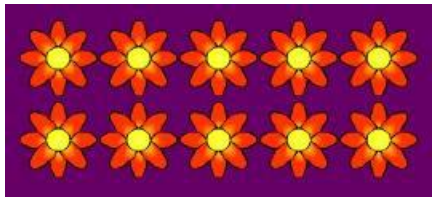
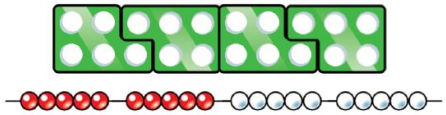
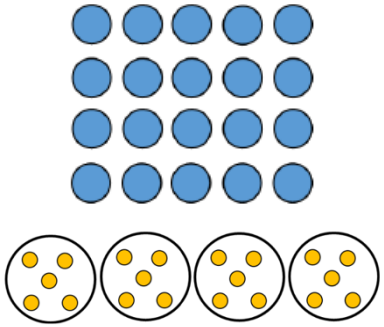
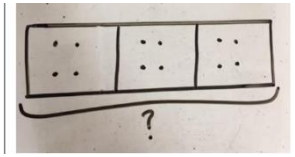
Multiplication

	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.

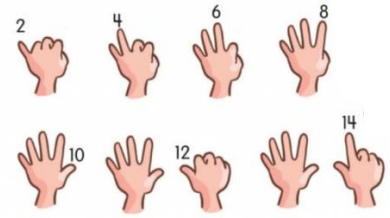
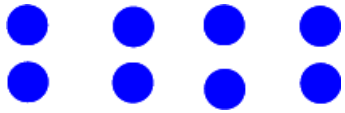
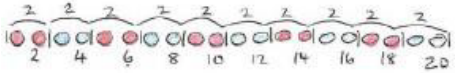
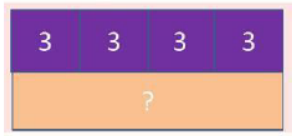
Maths Calculations and Representations Policy

	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. Before doubling can be introduced, children need to have a secure knowledge of counting, number facts and addition in order to double. Pupils explore odd and even numbers, whilst doubling.	Pupils carry out practical activities using manipulatives, such as cubes and Numicon, to demonstrate doubling.    Pupils act out doubling by physically combining two equal groups. 	Pupils use known representations to draw the 'mirrored' amount of a number.  Pupils draw representations of the objects they have used.  Pupils transfer their understanding of doubles to part-whole models. 	With support, pupils complete rehearsed sentence stems. ***Double 4 is ___.*** ***4 and 4 makes ___.***

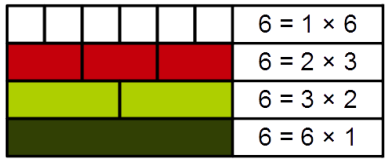
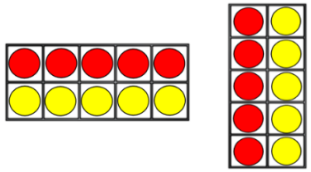
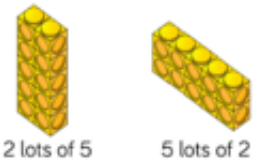
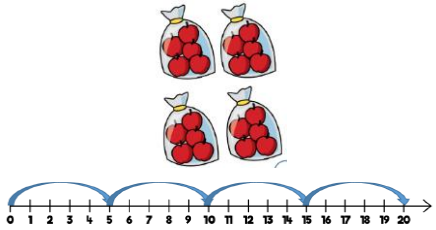
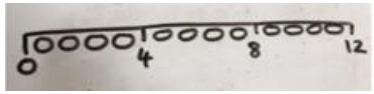
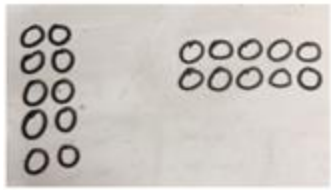
Maths Calculations and Representations Policy

	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. 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.   Pupils organise manipulatives to show repeated addition of equal groups. 	Pupils represent the practical resources using drawings.  Pupils show their understanding of repeated addition on a bar model. 	Pupils represent repeated addition using the addition symbol. $5 + 5 + 5 + 5 = 20$ ***'4 lots of 5 makes 20.'***

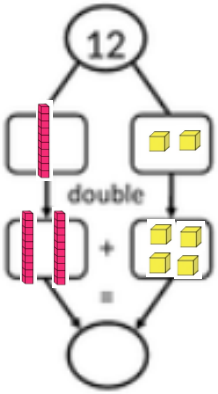
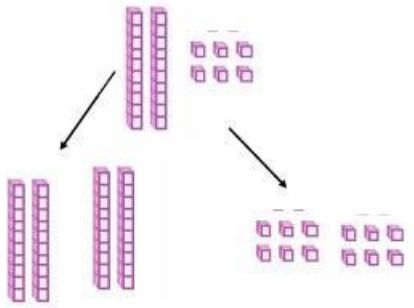
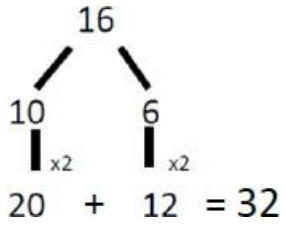
Maths Calculations and Representations Policy

	Small Step	Guidance	Concrete	Pictorial	Abstract
Year One	Count in multiples *(2, 5, 10)*	Pupils count in multiples of 2, 5 and 10 aloud. 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.  Pupils may use their fingers to help remember the groups they have counted. 	Pupils draw representations to show counting in multiples.  Pupils show their skip counting on a structured number line or track.  Pupils use a bar model to show multiples. 	Pupils write sequences with multiples of numbers. *2, 4, 6, 8, 10* *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. Pupils understand that multiplication is commutative. They understand that the order of the multiplication does not change the answer. *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.  Pupils create arrays, using objects such as counters and cubes, to illustrate commutativity.   	Pupils use a number line to solve repeated groups of multiples. One bag holds 5 apples. How many apples do 4 bags hold?  Pupils draw their own number lines. **4 x 3 =**  Pupils draw arrays to illustrate commutativity of multiplication facts. **2 x 5 =** 	Pupils use the multiplication symbol to represent a range of calculations that they have solved. **4 x 5 = 20** **5 x 4 = 20** **20 = 4 x 5** **20 = 5 x 4**

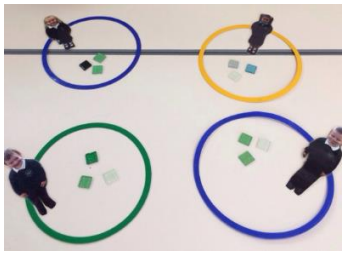
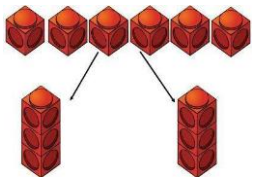
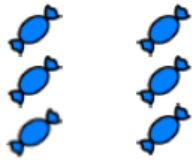
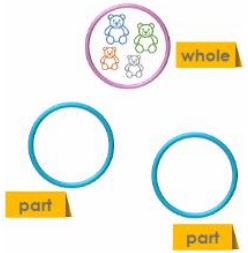
Maths Calculations and Representations Policy

	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. Pupils have an understanding that doubling means to multiply by two.	Pupils demonstrate doubling using dienes and place value counters to partition the number. **Double 12:** 	Pupils draw pictures and representations to demonstrate how to double numbers through partitioning. **Double 26:** 	Pupils use an expanded part-whole model to show how they have partitioned the number, before doubling each part. They show how the parts are recombined, using addition. **Double 16:** 

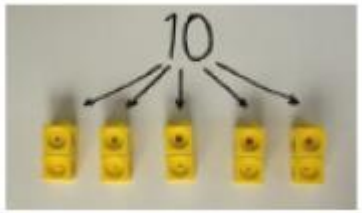
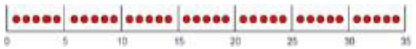
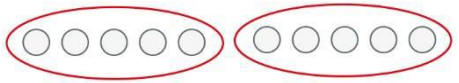
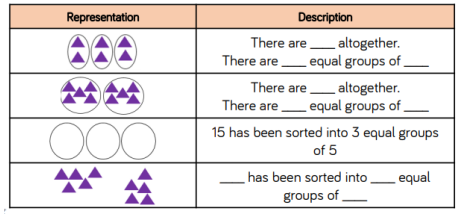
Maths Calculations and Representations Policy

Division

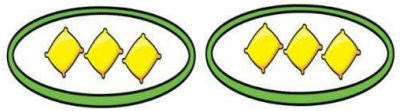
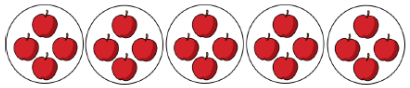
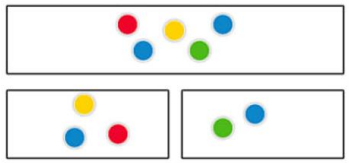
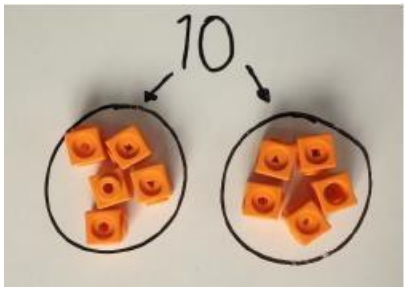
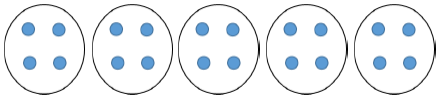
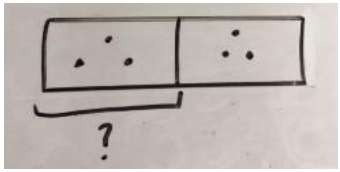
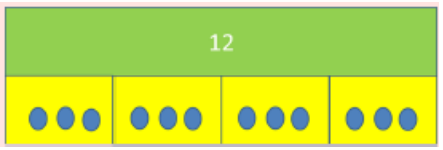
	Guidance
Pre-school	Pupils are introduced to the concept of sharing through practical games and activities. They act out sharing through activities such as sharing food for a Teddy Bears' Picnic or sharing resources equally to play a game. This is reinforced by opportunities provided in the outdoor area 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. 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.  	Pupils draw or colour pictures or shapes to share quantities.  Pupils share quantities using part-whole models and bar models. 	With support, pupils complete rehearsed sentence stems. **Share 6 buns between two people.** ***'6 buns shared between two people means they get ___ buns each.'***

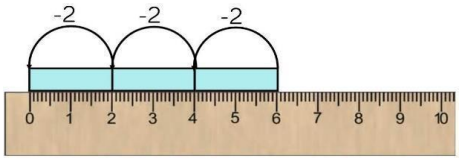
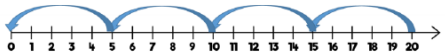
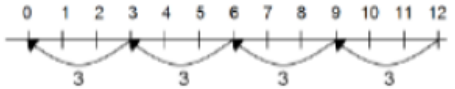
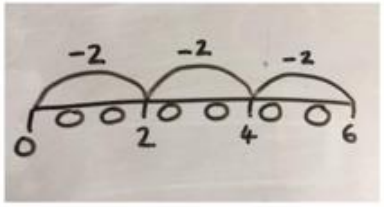
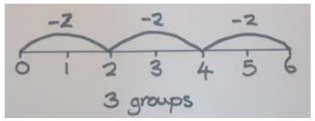
Maths Calculations and Representations Policy

	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. 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. 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.  *There are 10 children altogether.* *There are 2 in each group.* *There are 5 groups.* Pupils divide quantities in to equal groups. They use cubes, counters or objects to support understanding.  Beadstrings reinforce the concept of equal groups. 	Pupils represent a whole and work out how many equal groups.  *There are 10 in total.* *There are 5 in each group.* *There are 2 groups.* Pupils can develop their understanding of equal groups by also being exposed to numbers which do not group equally. 	With support, pupils complete rehearsed sentence stems. ***There are ___ in total.*** ***There are ___ in each group.*** ***There are ___ groups.*** 

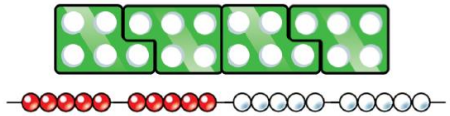
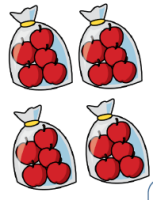
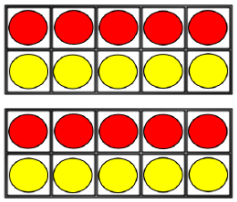
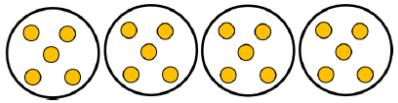
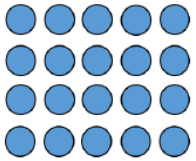
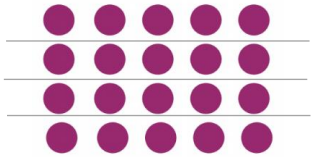
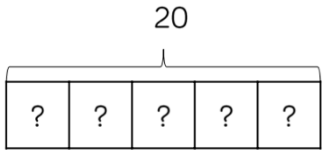
Maths Calculations and Representations Policy

	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. 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.   They apply their understanding of sharing within physical bar models and part-whole models.  	Pupils draw pictures or shapes to share quantities.  Pupils use bar modelling to show and support understanding. **6 divided by 2 is …**  ***A teacher shares 12 counters between 4 children. How many counters do they get each?*** 	Pupils complete sentence stems and link division with repeated addition. ***'6 shared between 2 is 3'*** ***'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. Pupils should also be encouraged to use known times tables facts, where appropriate.	Pupils carry out repeated subtraction using Cuisenaire rods above a ruler. **3 groups of 2** 	Pupils represent repeated subtraction pictorially, using structured number lines and then creating their own.  Pupils show jumps in groups. They understand that the number of jumps is the number of groups.  	Pupils become secure with representing division as an abstract number sentence using the division and equals symbol. $20 \div 5 = 4$ They use an abstract number line to represent the equal groups that have been subtracted. **6 ÷ 3 = 2** 

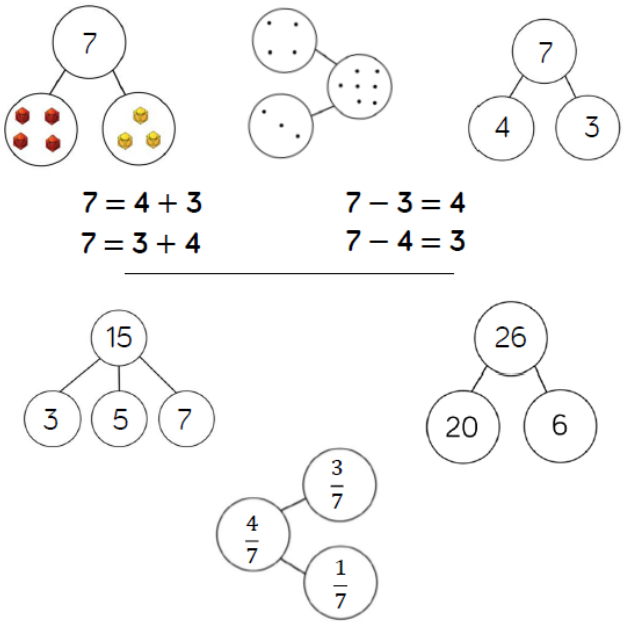
Maths Calculations and Representations Policy

	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. 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.    	Pupils draw arrays once they are secure at drawing equal groups of objects.   Pupils draw lines to divide their arrays in to groups.  They represent their understanding of arrays on bar models. 	Pupils focus on efficient strategies, and whether they should use grouping or sharing, depending on the context of the question. There are 20 apples altogether. They are put in bags of 5. How many bags are there? **20 ÷ 5 = 4** or **20 ÷ 4 = 5** ? Pupils create linking number sentences to show the relationship between division and multiplication. 4 x 5 = 20 4 = 20 ÷ 5 5 x 4 = 20 5 = 20 ÷ 4 20 ÷ 4 = 5 20 = 5 x 4 20 ÷ 5 = 4 20 = 4 x 5

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.

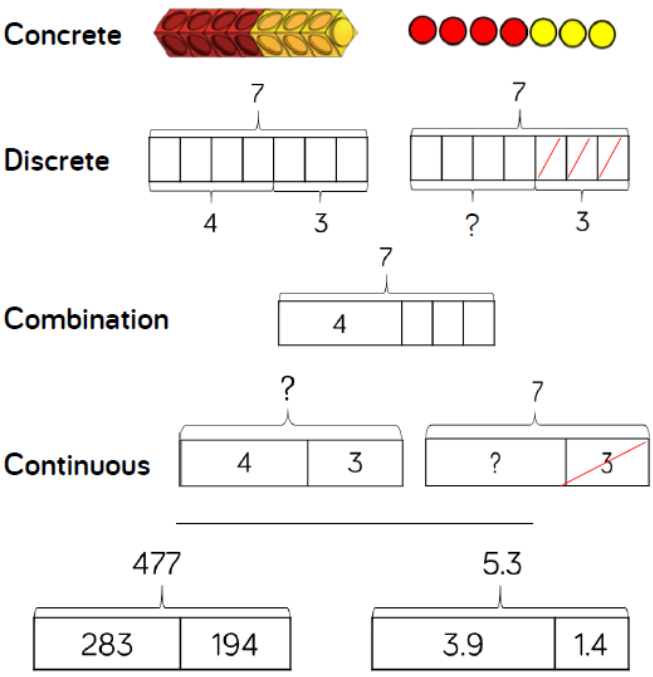
When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.

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.

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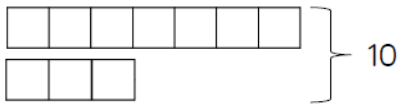
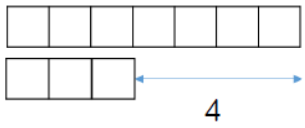
Bar Model (multiple)

Discrete

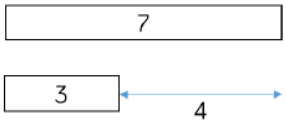


$7 + 3 = 10$

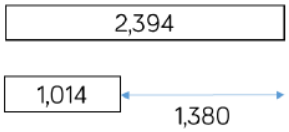


$7 - 3 = 4$

Continuous



$7 - 3 = 4$



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

Benefits

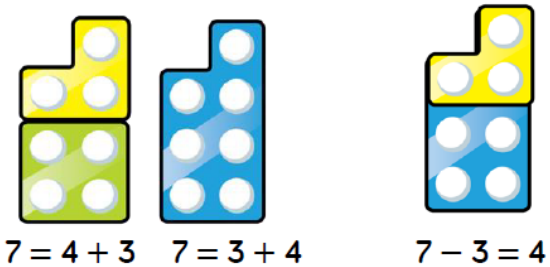
The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

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.

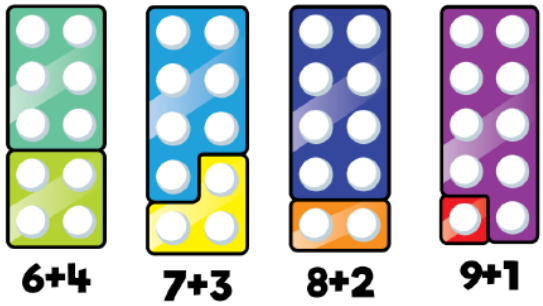
Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

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.

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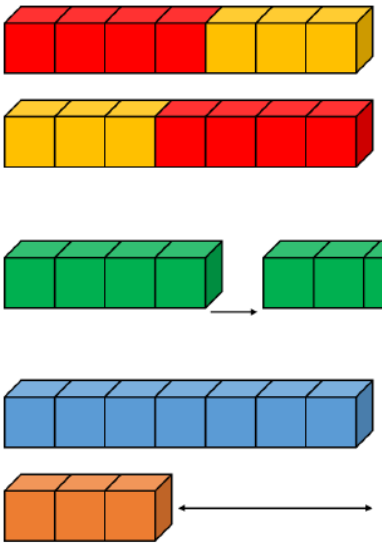
Cubes



Benefits

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

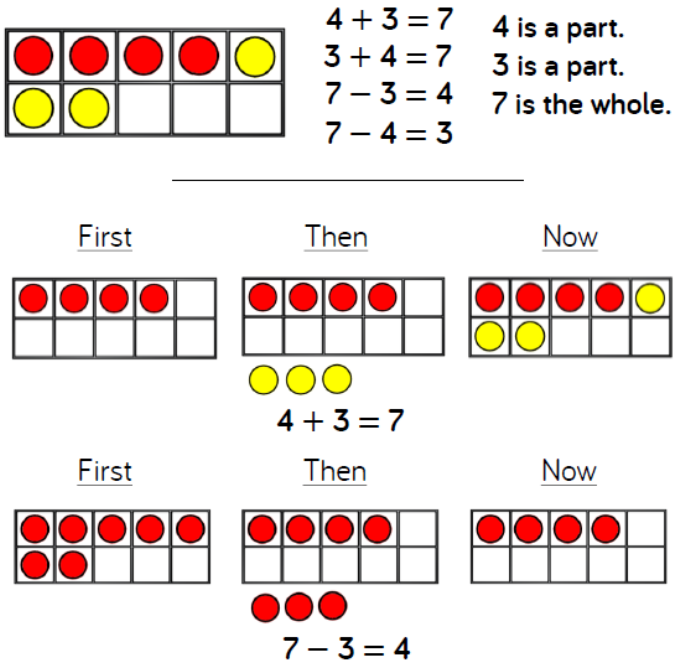
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

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.

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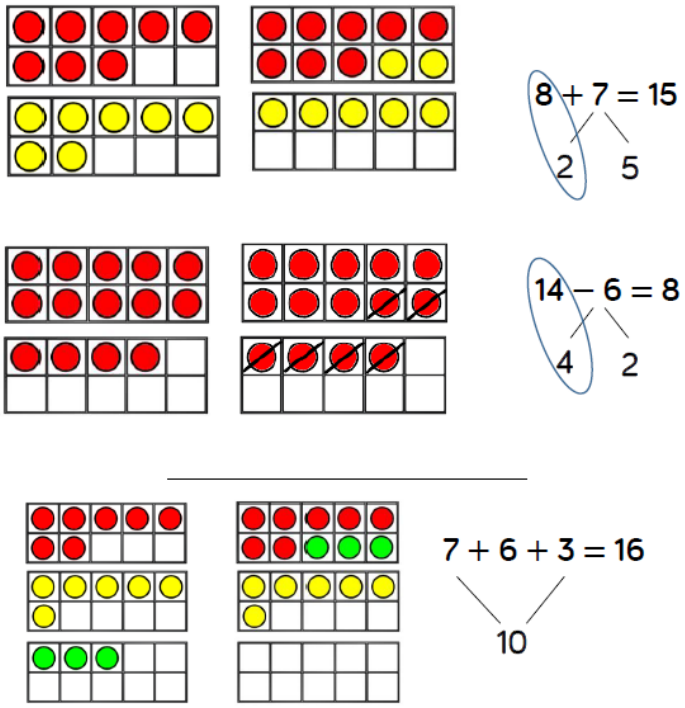
Ten Frames (within 20)



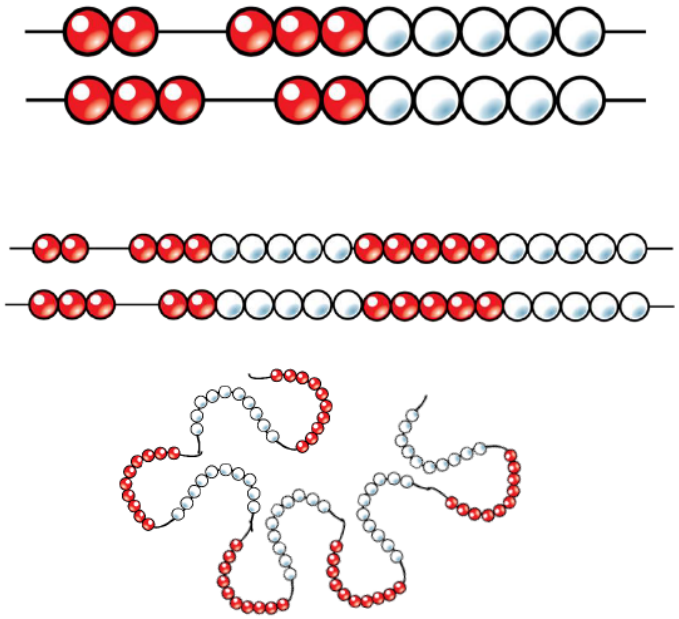
Benefits

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.

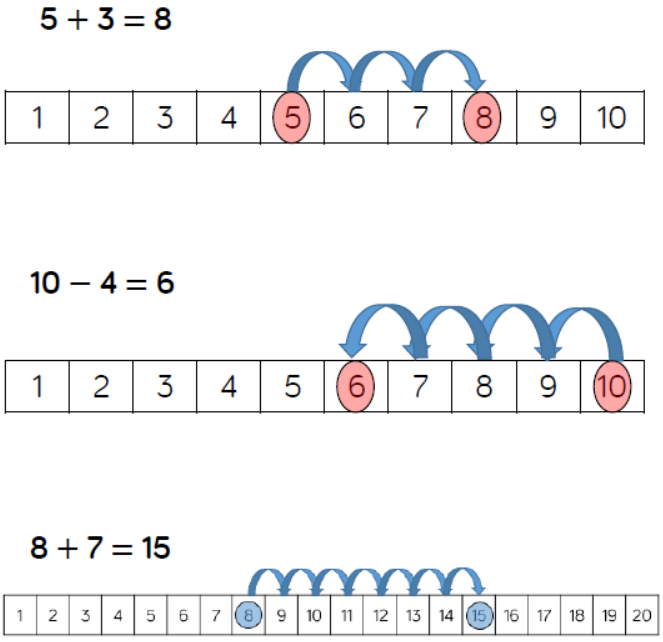
Bead strings to 10 are very effective at helping children to investigate number bonds up to 10.
They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. 2 + 8 = 10, move one bead, 3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

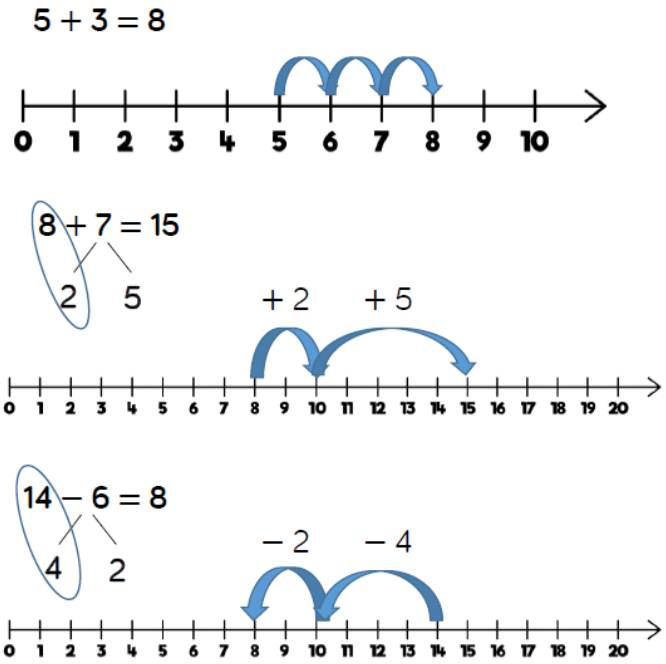
When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

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.

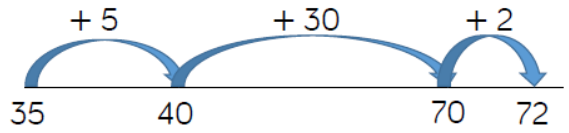
Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

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.

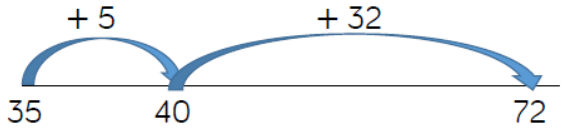
Maths Calculations and Representations Policy

Number Lines (blank)

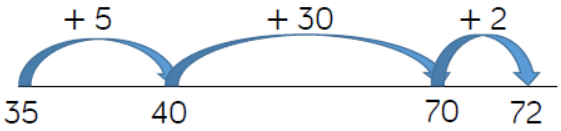
35 + 37 = 72



35 + 37 = 72



72 – 35 = 37



Benefits

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

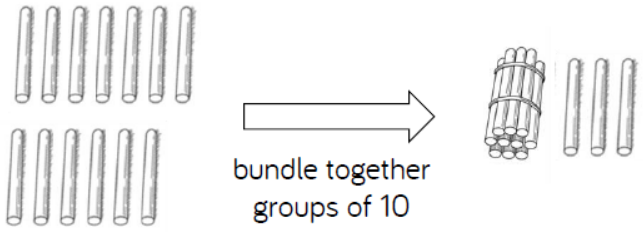
Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

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.

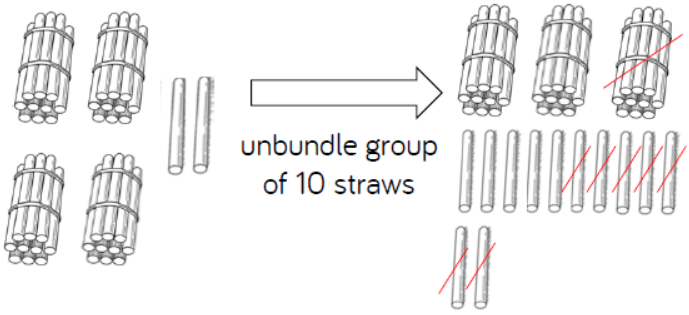
Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

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.

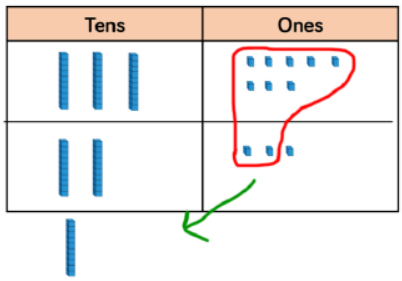
When adding numbers, children bundle a group of 10 straws to represent the exchange from 10 ones to 1 ten. They then add the individual straws (ones) and bundles of straws (tens) to find the total.

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

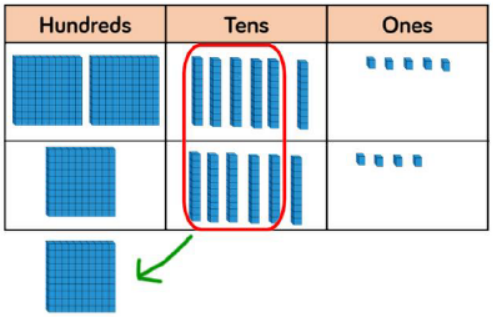
Straws provide a good stepping stone to adding and subtracting with Base 10/Dienes.

Maths Calculations and Representations Policy

Base 10/Dienes (addition)



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



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

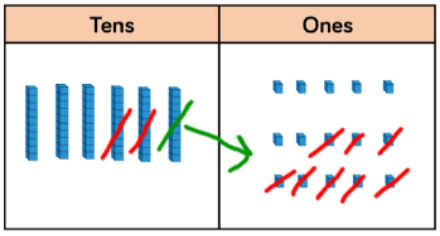
Benefits

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.

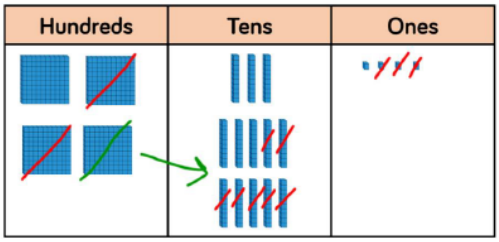
Children should first add without an exchange before moving on to addition with exchange.. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

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)



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



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

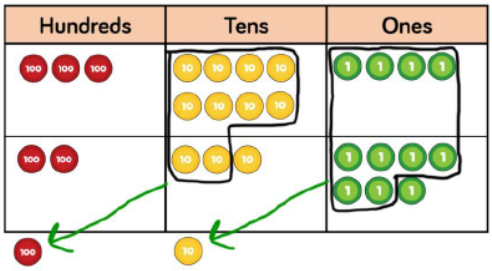
Benefits

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.

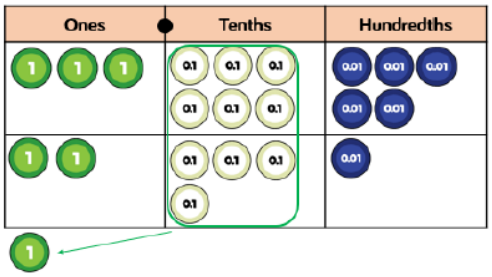
Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. Children start 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)



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



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

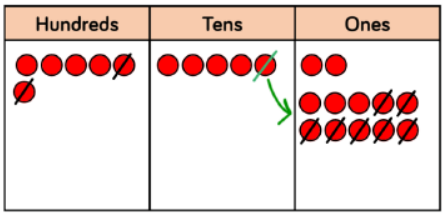
Benefits

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.

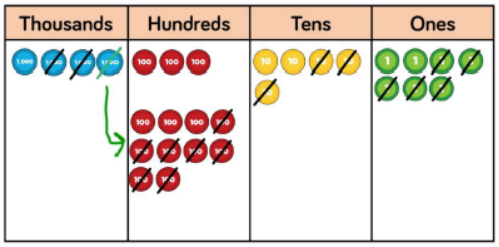
Children should first add without an exchange before moving on to addition with exchange. Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange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

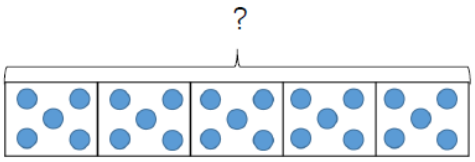
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

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.

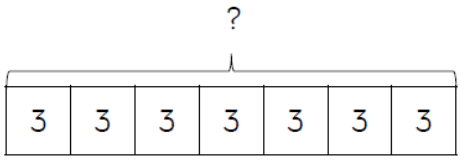
Maths Calculations and Representations Policy

Appendix 2 – Multiplication and Division Guidance

Bar Model

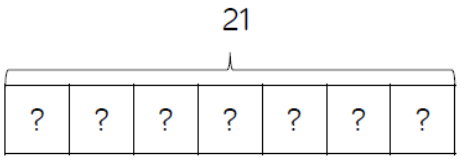


$5 \times 5 = 25$

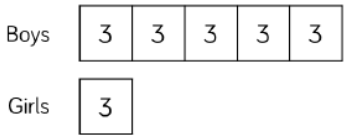


$3 \times 7 = 21$

$7 \times 3 = 21$



$21 \div 7 = 3$



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.

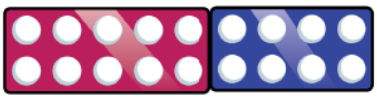
Number Shapes

$5 \times 4 = 20$

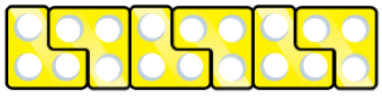
$4 \times 5 = 20$

$5 \times 4 = 20$

$4 \times 5 = 20$



$18 \div 3 = 6$



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

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

$15 \div 3 = 5$

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

$15 \div 5 = 3$

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

$20 \div 4 = 5$

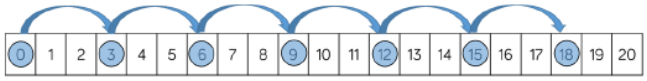
Benefits

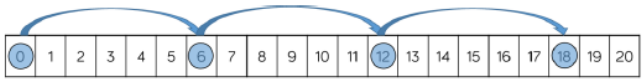
Bead strings to 100 can support children in their understanding of multiplication as repeated addition. Children can build the multiplication using the beads. The colour of beads supports children in seeing how many groups of 10 they have, to calculate the total more efficiently.
Encourage children to 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.

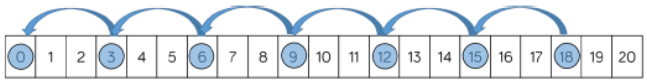
When dividing, children build the number they are dividing and then group the beads into the number they are dividing by e.g. 20 divided by 4 – Make 20 and then group the beads into groups of four. Count how many groups you have made to find the answer.

Number Tracks





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



$18 \div 3 = 6$

Benefits

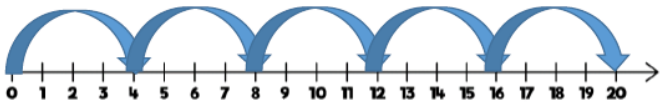
Number tracks are useful to support children to count in multiples, forwards and backwards. Moving counters or cubes along the number track can support children to keep track of their counting. Translucent counters help children to see the number they have landed on whilst counting.

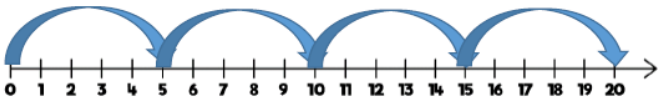
When multiplying, children place their counter on 0 to start and then count on to find the product of the numbers.
When dividing, children place their counter on the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0. Children record how many jumps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

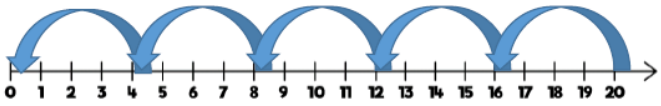
Maths Calculations and Representations Policy

Number Lines (labelled)





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



$20 \div 4 = 5$

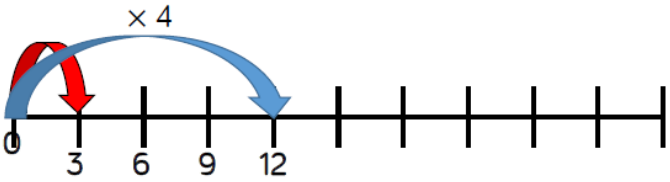
Benefits

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

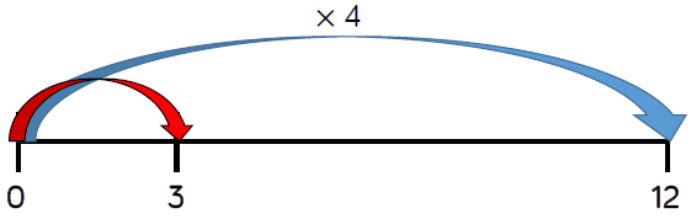
When multiplying, children start at 0 and then count on to find the product of the numbers.
When dividing, start at the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0.
Children record how many jumps they have made to find the answer to the division.

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

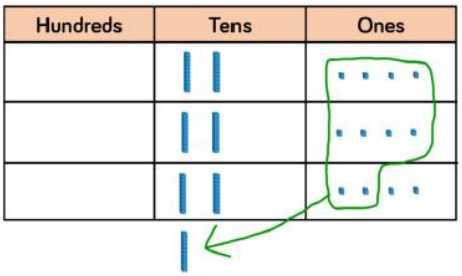
Children can use blank number lines to represent scaling as multiplication or division.

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

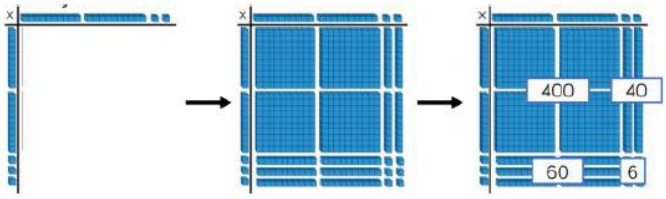
Blank number lines without intervals can also be used for children to represent scaling.

Maths Calculations and Representations Policy

Base 10/Dienes (multiplication)



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



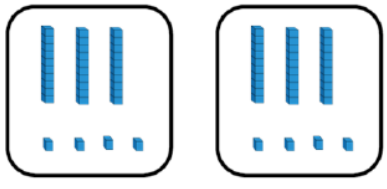
Benefits

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.

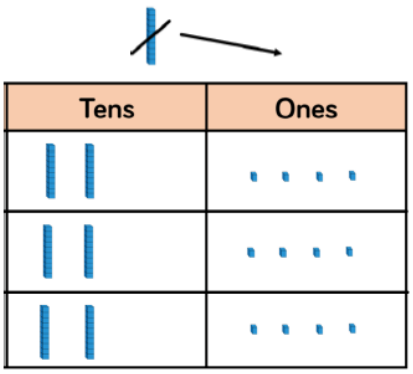
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed.

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.

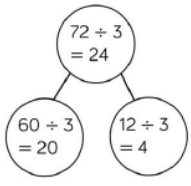
Base 10/Dienes (division)



$$68 \div 2 = 34$$



$$72 \div 3 = 24$$



Benefits

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

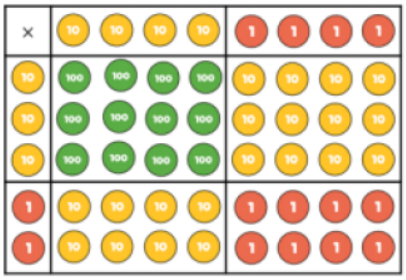
When numbers become larger, it can be an effective way to move children from representing numbers as ones towards representing them as tens and ones in order to divide. Children can then share the Base 10/ Dienes between different groups e.g. by drawing circles or by rows on a place value grid.

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)

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



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

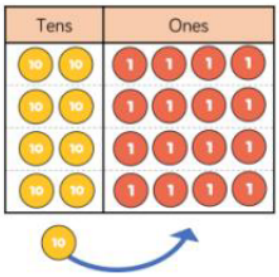
Benefits

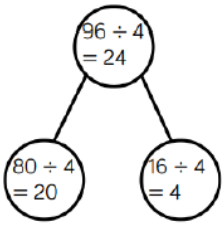
Using place value counters is an effective way to support children's understanding of column multiplication. It is important that children write out their calculation alongside the equipment so they can see how the concrete and written match.

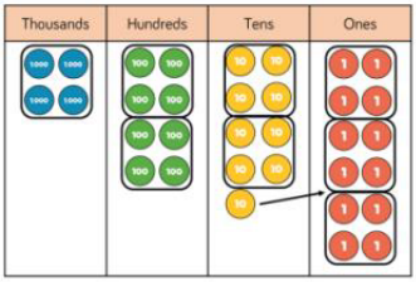
As numbers become larger in multiplication or the amounts of groups becomes higher, Base 10 / Dienes becomes less efficient due to the amount of equipment and number of exchanges needed The counters should be used to support the understanding of the written method rather than support the arithmetic.

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

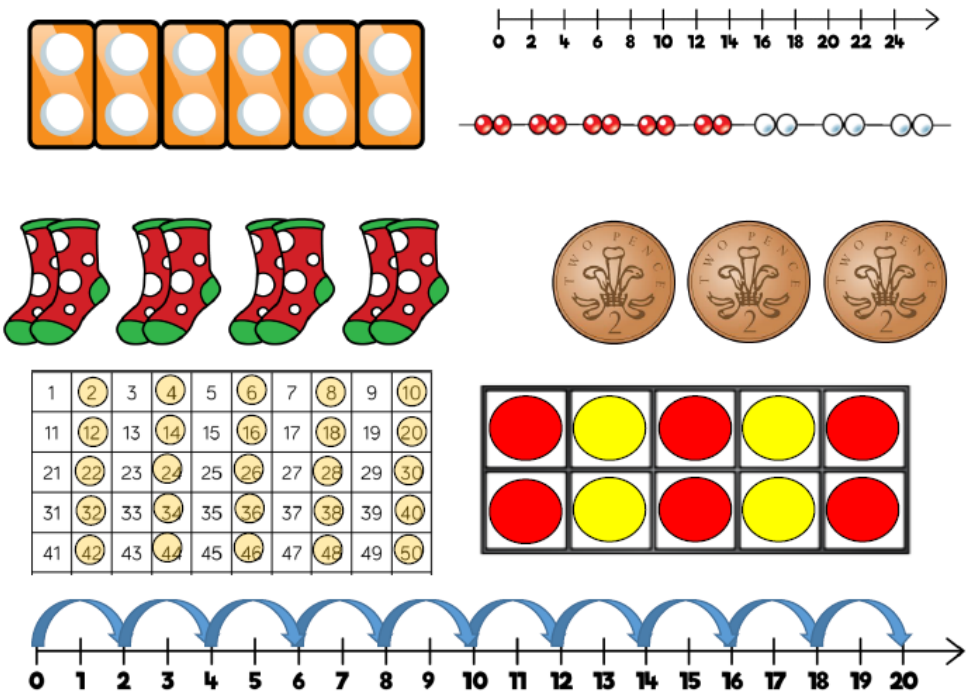
Using place value counters is an effective way to support children's understanding of division.

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. 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. Use different models to develop fluency.

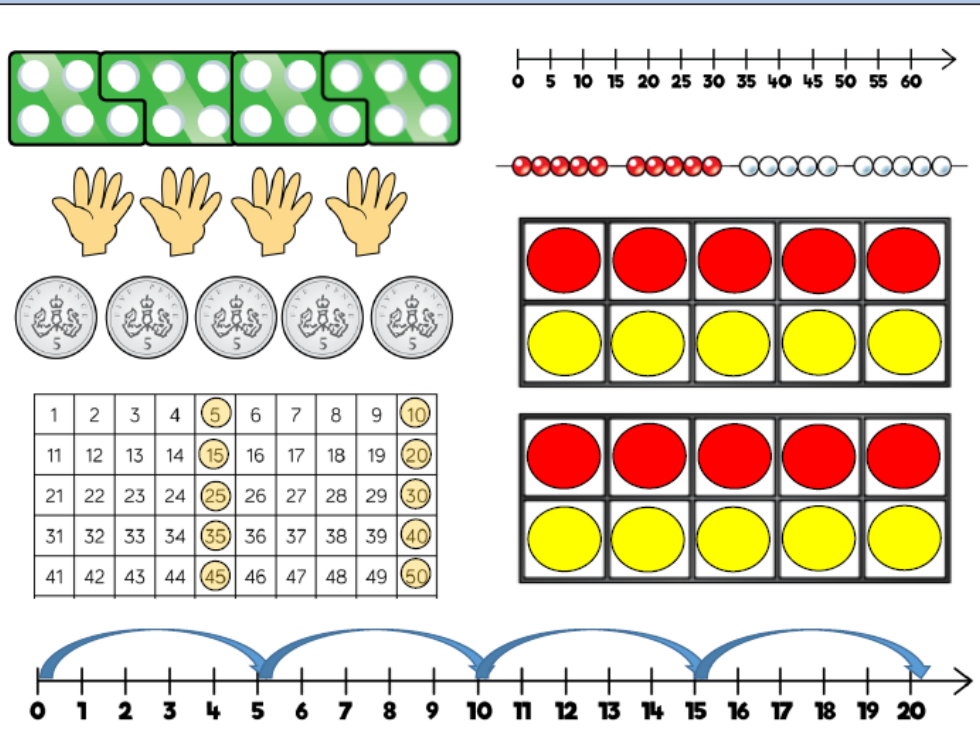
(0 × 2 = 0)
1 × 2 = 2
2 × 2 = 4
3 × 2 = 6
4 × 2 = 8
5 × 2 = 10
6 × 2 = 12
7 × 2 = 14
8 × 2 = 16
9 × 2 = 18
10 × 2 = 20
11 × 2 = 22
12 × 2 = 24

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

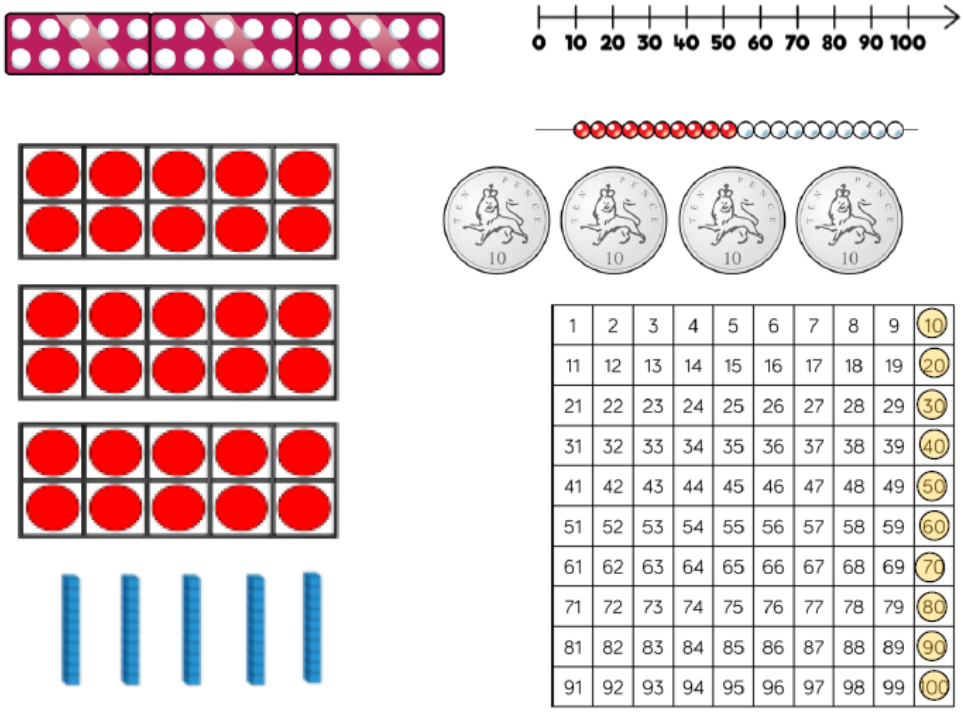
Skill: 5 times table	Year: 2
	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the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