BRINDLEY HEATH ACADEMY

WRITTEN CALCULATIONS POLICY

May 2020

OUR CALCULATION POLICY

A Brindley Heath Academy, we aim to provide our children with the maths skills they will need for life. This policy outlines the strategies they will be taught for each operation in a progressive manner and links with the National Curriculum 2014 for mathematics.

Building on the skills acquired during key stage one, choosing an appropriate strategy, recording method and calculation is a particularly important tool both for furthering the understanding of ideas and for communicating those ideas to others. A useful and efficient written method helps children to calculate accurately in ways which can be understood by others.

We believe that written methods are complementary to mental methods and fundamentally children should use mental strategies and then for calculations where mental strategies are not appropriate, they will be proficient at using written methods with accuracy and confidence. With this in mind, children must consider the following questions when faced with a calculation to enable them to ascertain their next steps.

AIMS OF OUR POLICY

- Ensure consistency and progression when teaching calculation methods.
- By the end of year 6, we hope that our pupils are able to choose the most appropriate approach to solve a problem, either mentally, using written jottings or a formal written method.
- Ensure pupils use each method accurately, confidently and with good understanding.

HOW TO USE OUR POLICY

The policy has been written using our Progression in Mathematics Document and is organised into operations and year groups.

- Use the policy when planning to ensure planning is personalised to the specific year group, but only when children are secure with the previous stage of development.
- If children make errors, revisit the previous stage.
- Use the correct vocabulary as detailed for each operation.
- Encourage the children to make sensible choices and articulate these choices.

CONCRETE, PICTORIAL AND ABSTRACT APPROACH

What is the Concrete, Pictorial and Abstract method?

The CPA method involves using actual objects for children to add, subtract, multiply or divide. They then progress to using pictorial representations of the object, and ultimately, abstract symbols.

Children often find maths difficult because it is abstract. The CPA approach helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way.

Concrete is the 'doing' stage, using concrete objects to solve problems. It brings concepts to life by allowing children to handle physical objects themselves. Every new abstract concept is learned first with a 'concrete' or physical experience.

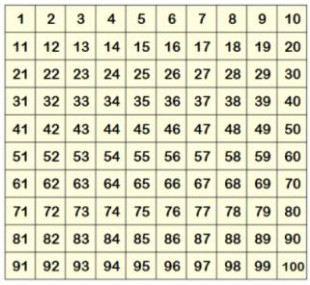
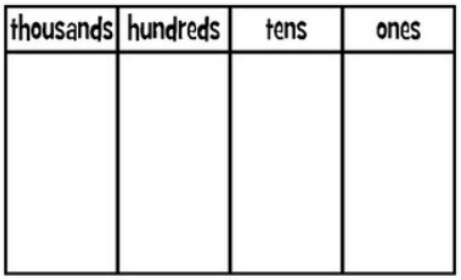
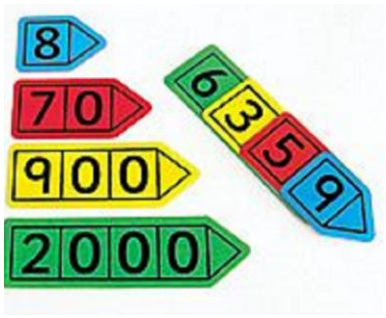
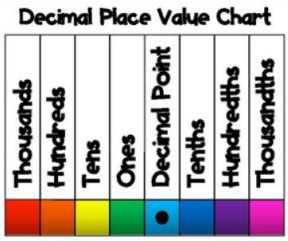
Pictorial is the 'seeing' stage, using representations of the objects involved in maths problems. This stage encourages children to make a mental connection between the physical object and abstract levels of understanding, by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem.
Building or drawing a model makes it easier for children to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

Abstract is the 'symbolic' stage, where children are able to use abstract symbols to model and solve maths problems.
Once a child has demonstrated that they have a solid understanding of the 'concrete' and 'pictorial' representations of the problem, the teacher can introduce the more 'abstract' concept, such as mathematical symbols. Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, –, x, / to indicate addition, multiplication, or division.

Children are often weaned off using concrete methods in KS2, as they're not allowed in SATs. However, in our school, the CPA method is still a great aid, even if children can just visualise the concrete objects, or represent them pictorially.

CONCRETE AND PICTORIAL APPARATUS

At Brindley Heath, each classroom should have a designated 'Maths Working Wall' along with concrete apparatus that are available to children to use with guidance when modelling, as well as during independent work. Children should be taught how to select apparatus appropriately and taught to use them accurately. Below are the apparatus that should be available in each classroom unless otherwise stated.

Place Value Counters 	Decimal Place Value Counters All other counters in 4, 5 and 6 classrooms. 	Dienes 
100 Square 	Place Value Chart 	Place Value Arrow Cards 
Cubes 	Counters 	Decimal Place Value Charts 

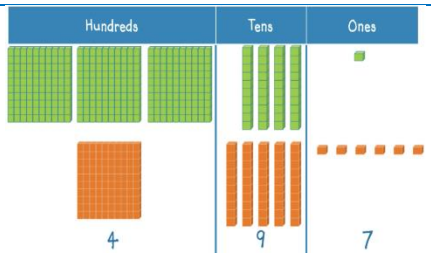
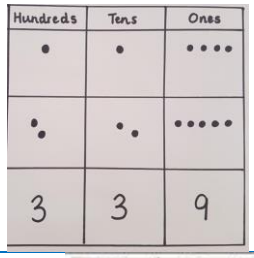
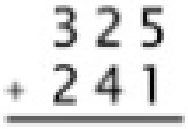
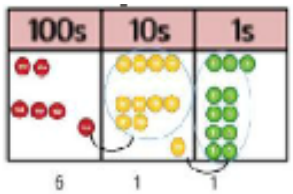
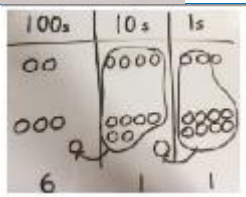
ADDITION YEAR 3

Expectations

- Add 3 digit numbers without carrying
- Add 3 digit numbers with carrying
- Solve missing number calculations
- Add 100 more up to 1,000

Key Vocabulary

Add, more, plus, and, make, altogether, total, equals, equal to, double, most, count on, sum, hundreds, tens, one, partition, addition, column, increase, vertical, exchange, carry.

Objective	Concrete	Pictorial	Abstract
I can add 3 digit numbers without regrouping	 Children should be encouraged to lie the apparatus in columns Begin adding from the smallest value, in this case the ones. It is good practice to include the addition symbol.	Record using a place value chart and counters drawn by the children or on laminated charts from the maths resources in each classroom. Children to label each column with the value or if confident either H, T and O or 100s, 10s or 1s. 	Digits must be lined up according to their value Begin adding from the smallest value digit, in this case the ones. Children can label each column with H, T and O's if required. 
I can add 3 digit numbers with regrouping	 Children should be encouraged to lie the apparatus in columns Begin adding from the smallest value, in this case the ones. Children to use place value counters or dienes to show the exchange.	 Children to draw place value grid and counters and show the exchange taking place by circling the marks.	1) Partition and Recombine 536+185 500+30+6 100+80+5 600+80+11 = 791 2) Progress to formal column addition to show the regrouping. 536 + 18 5 79 1 1

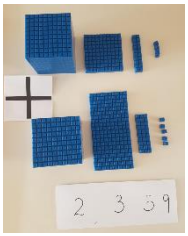
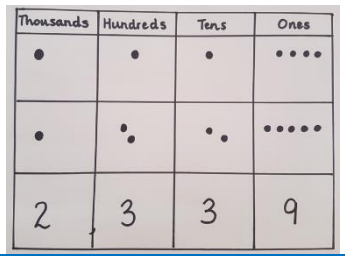
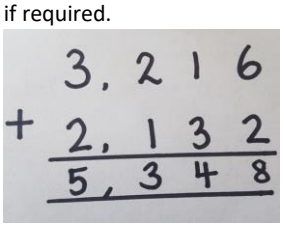
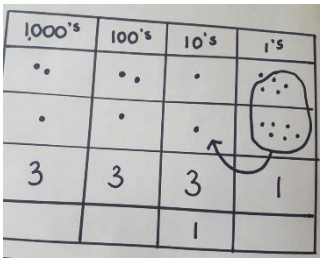
ADDITION YEAR 4

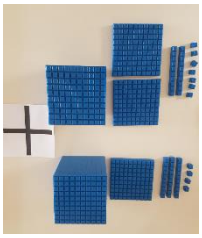
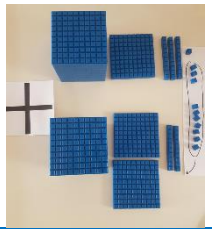
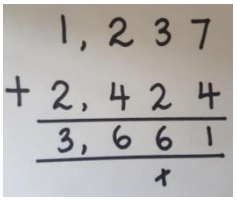
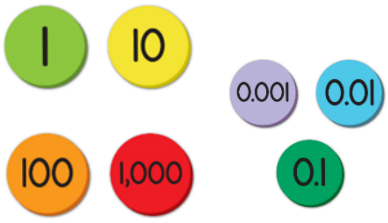
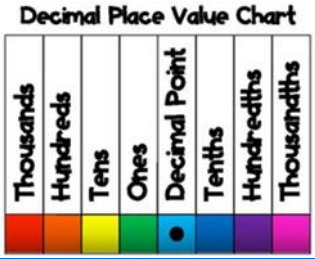
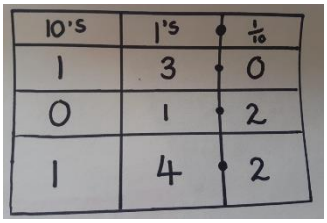
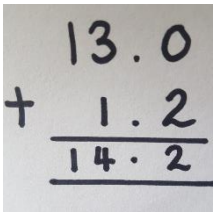
Expectations

- Add 4 digit numbers without carrying
- Add 4 digit numbers with carrying.
- Add whole number and decimals to one decimal place e.g. 345 + 2.6
- Add money to two decimal places e.g. £1.26 + £2.54
- Use addition to as an inverse checking method for year group appropriate calculations.

Key Vocabulary

Add, more, plus, and, make, altogether, total, equals, equal to, double, most, count on, sum, thousands, hundreds, tens, one, tenths, partition, addition, column, increase, vertical, exchange, carry and decimal place

Objective	Concrete	Pictorial	Abstract
I can add 4 digit numbers without regrouping	 Children should be encouraged to lie the apparatus in columns Begin adding from the smallest value, in this case the ones. A comma should be written after the thousands digit.	Record using a place value chart and counters drawn by the children or on laminated charts from the maths resources in each classroom. Children to label each column with the value or if confident Th, H, T and O.  	Digits must be lined up according to their value Begin adding from the smallest value digit, in this case the ones. A comma should be written after the thousands digit. Children can label each column with Th, H, T and O's if required. 
I can add 4 digit numbers with regrouping	Regrouping in one column to begin with and progress to two. Children should be encouraged to lie the apparatus in columns	Children to draw place value grid and counters and show the regrouping taking place by circling the marks.  	Digits must be lined up according to their value. Begin adding from the smallest value digit, in this case the ones. A comma should be written after the thousands digit. Children can label each column with Th, H, T and O's if required. Cross out 'regrouped' digits. If children cannot do this, you could use the partitioning method shown in year 3. Regrouping in one column to begin with and progress to two.

	Begin adding from the smallest value, in this case the ones. Children to use place value counters or dienes to show the exchange.  		Furthe challenge by adding numbers with different number of digits. 
Add whole number and decimals to one decimal place e.g. 345 + 2.6	Use place value counters, including decimal place value counters and a place value chart showing tenths and hundredths Children to begin adding with the lowest value digit, in this case the hundredths. Once secure, children can begin calculating with decimals involving regrouping. If regrouping, children to move the counters and regroup for the higher value counter.   	Children must have a good understanding of the value of tenths Record using a place value chart drawn by the children with counters or digits or on laminated charts from the maths resources in each classroom. Children to label each column with the value or if confident T, O as well as ths. Zero should be used as a place holder. Ensure the decimal point is present.  	Digits must be lined up according to their value. Begin adding from the smallest value digit, in this case the tenths. Children can label each column T's, O's and th if required. Zero should be used as a place holder and esnure the decimal point is present. 1) No carrying 2) Exchanging in one column 3) Exchanging in two columns Where regrouping has been used, children should 'cross out' the digit to show it has been added. 
I can add money to two decimal places e.g. £1.26 + £2.54	Children to add in the context of money to two decimal places and not exceeding £99.99. • Children should first complete calcualtions without carrying. • Children can then progress to one exchange. • Children can then progress to more than one exchange. Same principles of column additon outlined previously should be followed.		

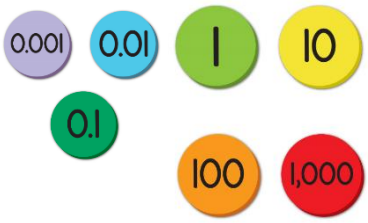
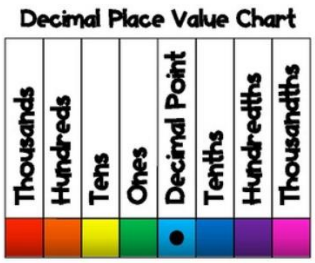
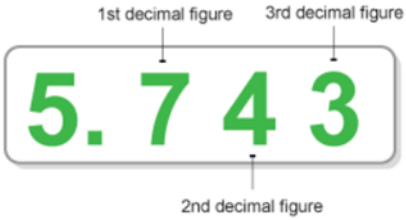
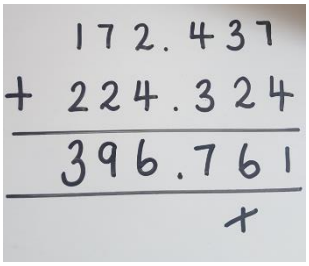
ADDITION YEAR 5

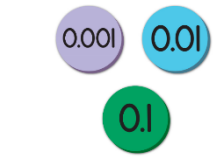
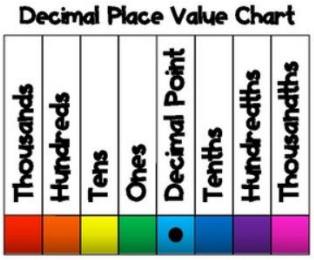
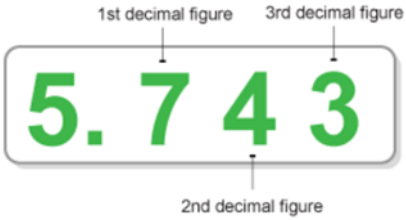
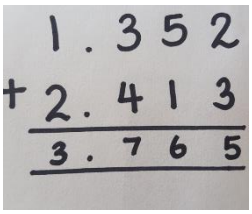
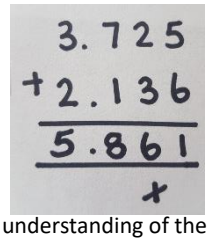
Expectations

- Continue to secure adding four digit numbers as well as numbers with a different number of digits.
- Add decimals up to 3 decimal places
- Add whole numbers and decimals up to 3 decimal places.
- Use addition to as an inverse checking method for year group appropriate calculations.

Key Vocabulary

Add, more, plus, and, make, altogether, total, equals, equal to, double, most, count on, sum, thousands, hundreds, tens, one, tenths, hundredths, thousandths, partition, addition, column, increase, vertical, exchange, carry and decimal place

Objective	Concrete	Pictorial	Abstract
I can add whole number to numbers with 3 decimal places.	Use place value counters, including decimal place value counters and a place value chart showing tenths, hundredths and thousandths. Children to begin adding with the lowest value digit, in this case the thousandths. Once secure, children can begin calculating with decimals involving regrouping. If carrying, children to move the counters and exchange for the higher value counter.  	 Children must have a good understanding of the value of each digit as tenths, hundredths and thousandths. Children to draw a decimal place value grid or use a laminated one available in the classroom. Children to draw 'spots' appropriately in each column. Children to begin adding with the lowest value digit, in this case the thousandths. Once secure, children can begin calculating with decimals involving regrouping. If carrying, children to show the exchange that has taken place. The first regrouping should happen within the thousandths column. Ensure 0 is used a place holder and the decimal point is present.	Children to write each digit in the correct column according to its value. Children to begin adding with the lowest value digit, in this case the thousandths. Begin with calculations that do not involve carrying. Progress to 1 exchange in the thousandths column. Ensure the carried digit is crossed out to show it has been added. Further exchanges in the hundredths and tenths column can then be used. Children to be challenged to add numbers with different number of digits. Ensure zero is used a place holder. 

I can add decimals up to 3 decimal places.	Use place value counters, including decimal place value counters and a place value chart showing tenths, hundredths and thousandths. Children to begin adding with the lowest value digit, in this case the thousandths. Once secure, children can begin calculating with decimals involving regrouping. If regrouping, children to move the counters and exchange for the higher value counter.  	 Children must have a good understanding of the value of each digit as tenths, hundredths and thousandths. Children to draw a decimal place value grid or use a laminated one available in the classroom. Children to draw 'spots' appropriately in each column. Children to begin adding with the lowest value digit, in this case the thousandths. Once secure, children can begin calculating with decimals involving carrying. If carrying, children to show the exchange that has taken place. The first exchange should happen within the thousandths colomn. Ensure 0 is used a place holder and the decimal point is present.	  Children must have a good understanding of the value of each digit as tenths, hundredths and thousandths. Children to begin adding with the lowest value digit, in this case the thousandths. Begin with calculations that do not involve regrouping. Progress to 1 exchange in the thousandths column. Ensure the regrouped digit is crossed out to show it has been added. Further exchanges in the hundredths and tenths column can then be used. Children to be challenged to add numbers with different number of digits. Ensure zero is used a place holder.

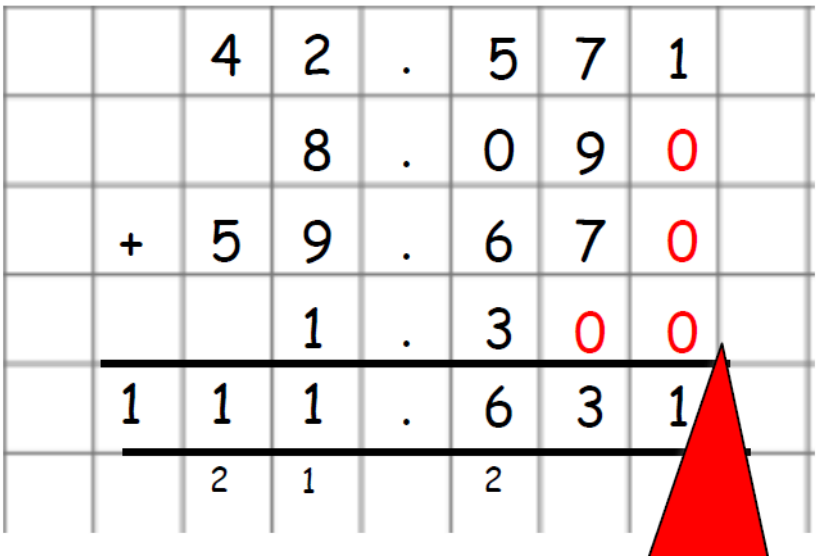
ADDITION YEAR 6

Expectations

- Add several numbers of increasing complexity including:
- Add decimals up to 3 decimal places
- Add whole numbers and decimals up to 3 decimal places.
- Use addition to as an inverse checking method for year group appropriate calculations.

Key Vocabulary

Add, more, plus, and, make, altogether, total, equals, equal to, double, most, count on, sum, thousands, hundreds, tens, one, tenths, hundredths, thousandths, partition, addition, column, increase, vertical, exchange, carry and decimal place

Objective	Abstract
I can add several numbers with increasing complexity	

		4	2	.	5	7	1	
			8	.	0	9	0	
	+	5	9	.	6	7	0	
			1	.	3	0	0	
	1	1	1	.	6	3	1	
		2	1		2			

Calculations with different number of digits
Calculations with numbers with up to three decimal places
Line digits correctly in columns according to their value
Use zero as a place holder
Begin adding with the lowest value digit, in the case above, the thousandths.

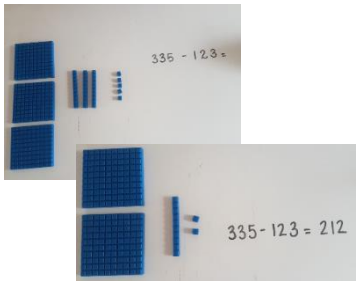
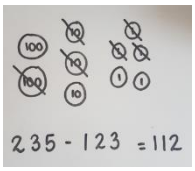
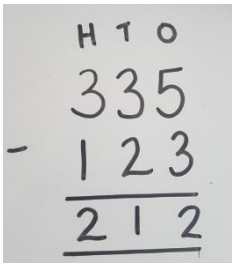
SUBTRACTION YEAR 3

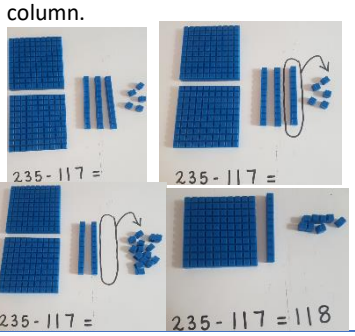
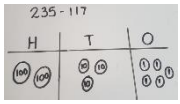
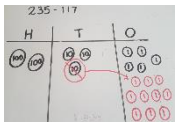
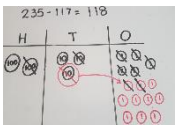
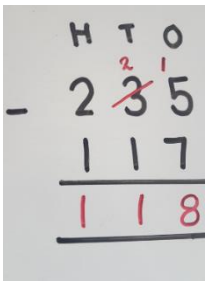
Expectations

- Subtract numbers with up to three digits without exchange
- Subtract numbers with up to three digits with exchange
- Find 10 or 100 less than a given number
- Solve missing number calculations

Key Vocabulary

Subtract, take away, minus, how many are left, left over, leave, one less, two less, ten less, one hundred less, how many fewer is, difference between, tens boundary and hundred boundary.

Objective	Concrete	Pictorial	Abstract
I can subtract numbers up to 3 digits without exchange	Children should be able to recognise the highest value number and use the apparatus to represent this. They can then 'take away' the other number. It is good practice to start subtracting the ones first as this will help when children progress to using apparatus involving exchange. 	Children should be able to recognise the highest value number and draw place value counters to represent this. They can then 'take away' the other number by crossing out the counters. The counters left can then be counted and interpreted as the answer. It is good practice to start subtracting the ones first as this will help when children progress to using pictorial representations involving exchange. Other pictorial representations could be used such as dienes rods. 	Digits must be lined up according to their value with the highest value number first. Begin subtracting the ones, then the tens and finally the hundreds. Children can label each column with H, T and O's if required. 

I can subtract numbers up to 3 digits with exchange	Children must have a good understanding that they cannot subtract a higher value number from a smaller. Children should recognise the highest value number and use apparatus to represent this. They should then begin subtracting the ones first. If the number being subtracted is larger, the children must exchange from the next column. This is shown by taking the ten rod and exchanging it for 10 ones. and moving them to the ones column. 	Children should record using a place value chart drawn by the children with counters or digits or on laminated charts from the maths resources in each classroom. Children should recognise the highest value number and draw counters to represent this. They should then begin subtracting the ones first. If the number being subtracted is larger, the children must exchange from the next column. This is shown by taking the ten rod and exchanging it for 10 ones.   	Digits must be lined up according to their value with the highest value number first. Begin subtracting the ones, then the tens and finally the hundreds. If the number being subtracted is larger, the children must exchange from the next column. This should be shown by crossing out the digit, writing the new digit and writing a '1' next the digit they are subtracting from. Children can label each column with H, T and O's if required. 

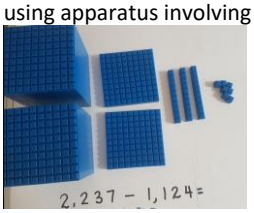
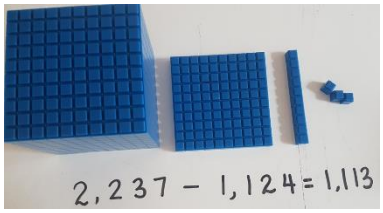
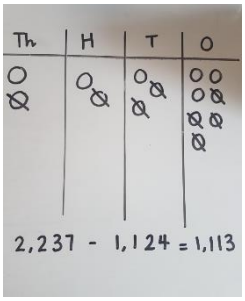
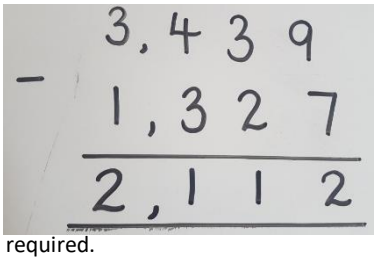
SUBTRACTION YEAR 4

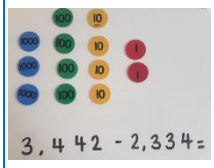
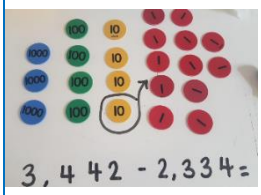
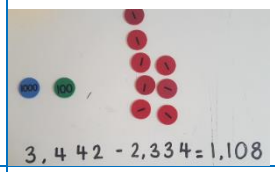
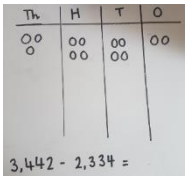
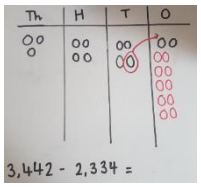
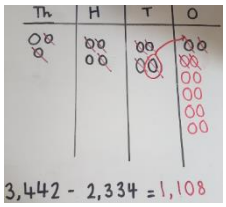
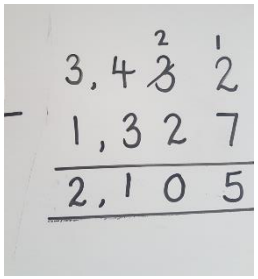
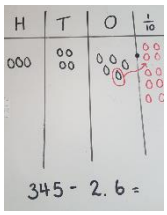
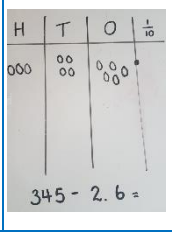
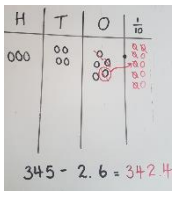
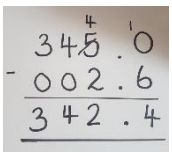
Expectations

- Subtract numbers with up to four digits without exchange
- Subtract numbers with up to four digits with exchange
- Find 1,000 less than a given number
- Subtract decimals to decimals to one decimal place e.g. 3.5 - 2.3
- Subtract whole number and decimals to one decimal place e.g. 345 - 2.6
- Subtract money to two decimal places 3.g £1.26 - £0.54
- Use subtraction to as an inverse checking method for year group appropriate calculations.

Key Vocabulary

Subtract, take away, minus, how many are left, left over, leave, one less, two less, ten less, one hundred less, one thousand less, decimal place, tenths, hundredths, how many fewer is, difference between, tens boundary, hundred boundary and thousands boundary.

Objective	Concrete	Pictorial	Abstract
I can subtract 4 digit numbers without exchange	Children should be able to recognise the highest value number and use the apparatus to represent this. They can then 'take away' the other number. It is good practice to start subtracting the ones first as this will help when children progress to using apparatus involving exchange.   	Children should record using a place value chart drawn by the children with counters or digits or on laminated charts from the maths resources in each classroom. Children should be able to recognise the highest value number and draw place value counters to represent this. They can then 'take away' the other number by crossing out the counters. The counters left can then be counted and interpreted as the answer. It is good practice to start subtracting the ones first as this will help when children  progress to using pictorial representations involving exchange. Other pictorial representations could be used such as dienes rods.	Digits must be lined up according to their value with the highest value number first. Begin subtracting the ones, then the tens, hundreds and finally the thousands. Children can label each column with Th, H, T and O's if  required.

I can subtract 4 digit numbers with exchange	Children must have a good understanding that they cannot subtract a higher value number from a smaller. Children should recognise the highest value number and use apparatus to represent this. They should then begin subtracting the ones first. If the number being subtracted is larger, the children must exchange from the next column. This is shown by taking the ten rod and exchanging it for 10 ones and moving them to the ones column.   	Children should record using a place value chart drawn by themselves or a laminated one. They should recognise the highest value number and draw counters to represent this. They should then begin subtracting the ones first. If the number being subtracted is larger, the children must exchange from the next column. This is shown by taking the ten rod and exchanging it for 10 ones.   	Digits must be lined up according to their value with the highest value number first. Begin subtracting the ones, then the tens, then the hundreds and finally the thouands. If the number being subtracted is larger, the children must exchange from the next column. This should be shown by crossing out the digit, writing the new digit and writing a '1' next the digit they are subtracting from. Children can label each column with Th, H, T and O's if required. 
Subtract whole number and decimals to one decimal place e.g. 345 - 2.6 **Subtract decimals to decimals to one decimal place e.g. 3.5 - 2.3**	Use place value counters, including decimal place value counters and a place value chart showing tenths and hundredths Children to begin subtracting with the lowest value digit, in this case the hundredths. When exchanging, children to move the counters and exchange as above. 	Children must have a good understanding of the value of tenths. Children should record using a place value chart drawn by the children with counters or digits or on laminated charts from the maths resources in each classroom. Children to label each column with the value or if confident T, O as well as ths.  Zero should be used as a place holder. Ensure the decimal point is present.  	Digits must be lined up according to their value. Begin subtracting from the smallest value digit, in this case the tenths. Children can label each column T's, O's and th if required. Zero should be used as a place holder and ensure the decimal point is present. First, children will exchange in one column and have calculations where they are exchanging in two columns. When exchanging, children should show the exchange in the same was as when subtracting whole numbers. 
Subtract money to two decimal places e.g. £1.26 - £0.54	Children to subtract in the context of money to two decimal places and not exceeding £99.99. • Children should first complete calcualtions without exchange. • Children can then progress to one exchange. • Children can then progress to more than one exchange. Same principles of column subtraction outlined previously should be followed.		

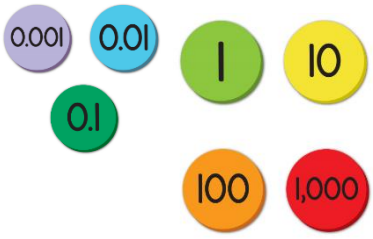
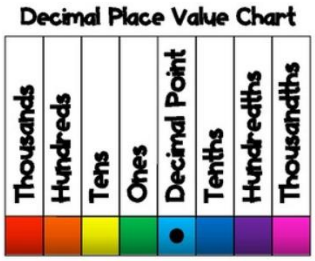
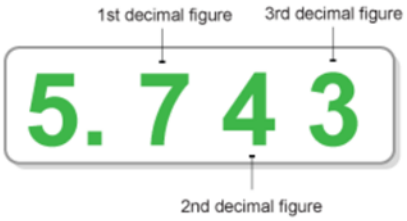
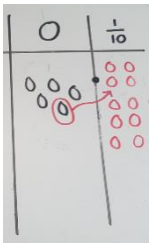
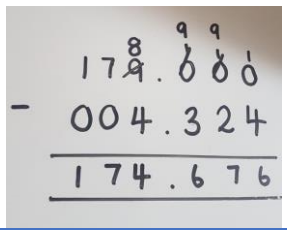
SUBTRACTION YEAR 5

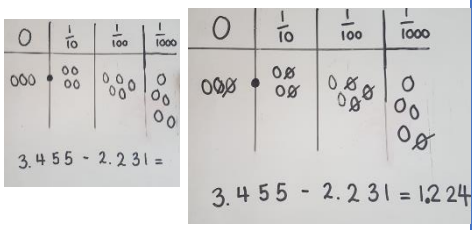
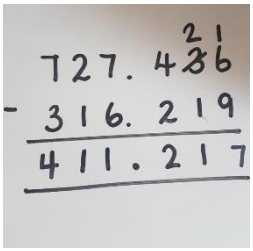
Expectations

- Continue to secure subtracting four digit numbers as well as numbers with a different number of digits.
- I can subtract decimals up to 3 decimal places
- I can subtract whole numbers and decimals up to 3 decimal places
- Use subtraction to as an inverse checking method for year group appropriate calculations.

Key Vocabulary

Subtract, take away, minus, how many are left, left over, leave, one less, two less, ten less, one hundred less, one thousand less, decimal place, tenths, hundredths, thousandths, how many fewer is, difference between, tens boundary, hundred boundary and thousands boundary.

Objective	Concrete	Pictorial	Abstract
I can subtract whole number to numbers with 3 decimal places.	Use place value counters, including decimal place value counters and a place value chart showing tenths, hundredths and thousandths. Children to begin subtracting with the lowest value digit, in this case the thousandths. When exchanging, children to move the counters and exchange as shown in year 4. This will involve multiple exchanges and children must be secure with exchanging before doing this.  	 Children must have a good understanding of the value of each digit as tenths, hundredths and thousandths. Children to draw a decimal place value grid or use a laminated one available in the classroom. Children to draw 'spots' appropriately in each column. Children to begin subtracting with the lowest value digit, in this case the thousandths. The first exchange should happen within the thousandths column. Ensure 0 is used a place holder and the decimal point is present. . This will involve multiple exchanges and children must be secure with exchanging before doing this. 	Children to write each digit in the correct column according to its value. Children to begin subtracting with the lowest value digit, in this case the thousandths. Begin with calculations that do not involve exchange. Progress to 1 exchange in the thousandths column. Ensure the exchange is shown the same as in other year groups. Further exchanges in the hundredths and tenths column can then be used. Children to be challenged to subtract numbers with different number of digits. Ensure zero is used a place holder. This will involve multiple exchanges and children must be secure with exchanging before doing this. 

I can subtract decimals up to 3 decimal places	Use place value counters, including decimal place value counters and a place value chart showing tenths, hundredths and thousandths. Children to begin subtracting with the lowest value digit, in this case the thousandths. When exchanging, children to move the counters and exchange as shown in year 4.	Children must have a good understanding of the value of tenths. Children should record using a place value chart drawn by the children with counters or digits or on laminated charts from the maths resources in each classroom. Children to label each column with the value or if confident T, O as well as thouandsth, hundredths and tenths.. Zero should be used as a place holder. Ensure the decimal point is  	Digits must be lined up according to their value. Begin subtracting from the smallest value digit, in this case the tenths. Children can label each column T's, O's, tenths, hundredths and thousandths if required. Zero should be used as a place holder and ensure the decimal point is present. First, children will exchange in one column and have calculations where they are exchanging in two columns. When exchanging, children should show the exchange in the same was as when subtracting whole numbers. 

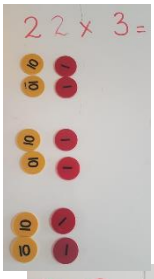
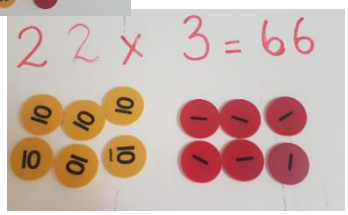
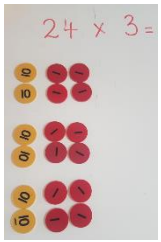
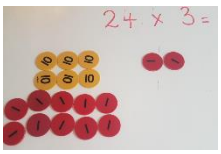
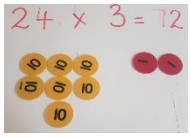
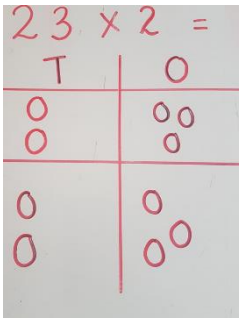
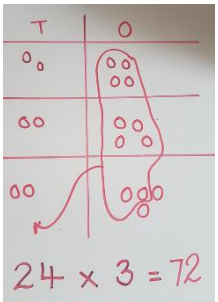
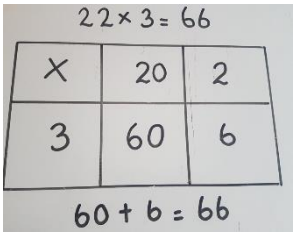
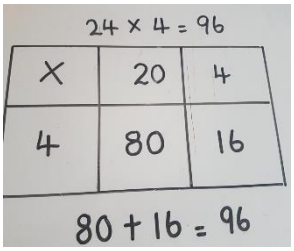
MULTIPLICATION YEAR 3

Expectations

- Recall 2,3,4,5,6 and 10 times tables
- I can multiply a 2 digit number by a 1 digit number using the grid method (linked to arrays)

Key Vocabulary

Multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative and product.

Objective	Concrete	Pictorial	Abstract
I can multiply a 2 digit number by a 1 digit number using the grid method	Using place value counters or dienes, children should make the 2 digit number and repeat this for the number of times the number is being multiplied. They should then combine the tens and one and interept the amount to find the answer.   For larger numbers, children will need to exchange as shown below.   	Children can use place value grids to represent two digit numbers. They should draw circles to represent the number and then repeat to show how many times the number is mutliplied. The tens and ones can then be combined to find the answer. Children should be raught to begin the calcualtion with the ones in preparation for form method.   For larger numbers, the exchange can be shown as below.	Children will use a grid or be given a pre-drawn grid. The will be experienced at partioning 2 digit numbers into tens and ones. They will write the numbers into the grid showing the partitioned 2 digit number and then the one digit numbers. 0 must be used as a place holder. Multipliy the one digit number by the ones and then the one digit number by the tens. The numbers within the grid can then be recombined to find the answer.  

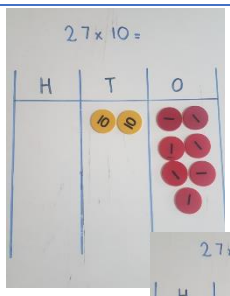
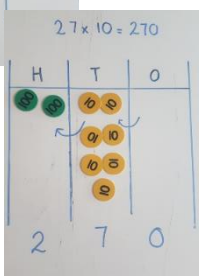
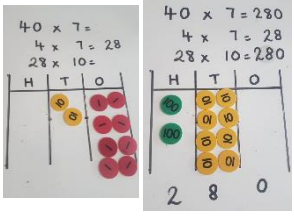
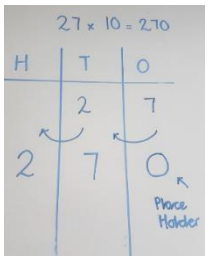
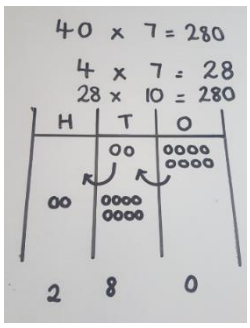
MULTIPLICATION YEAR 4

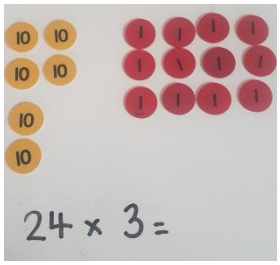
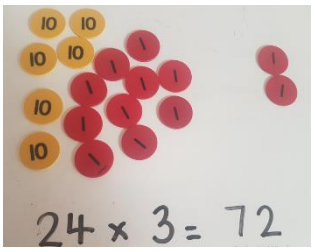
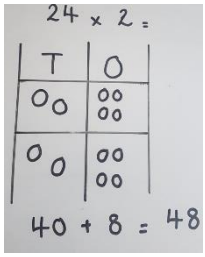
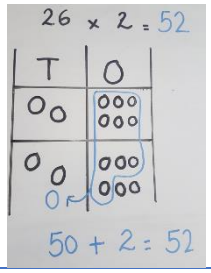
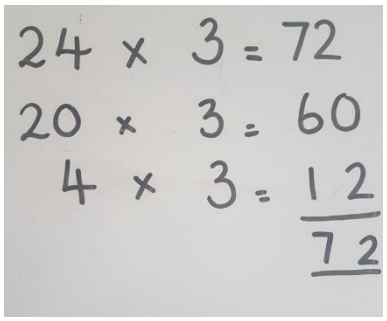
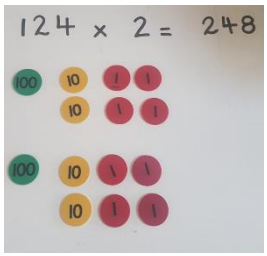
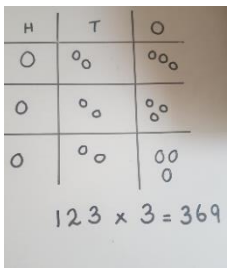
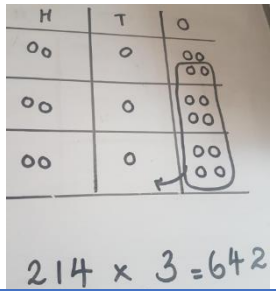
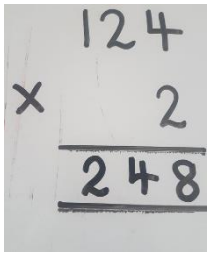
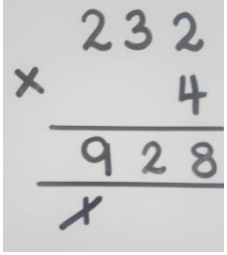
Expectations

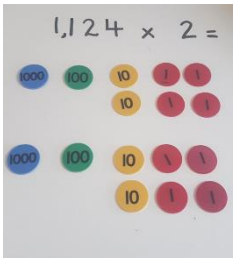
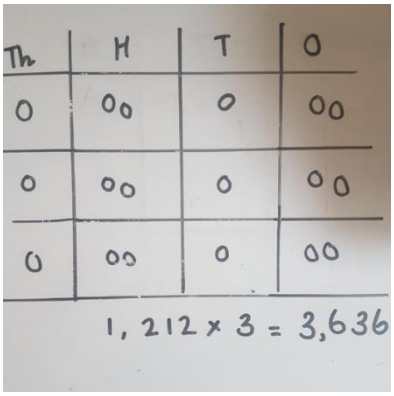
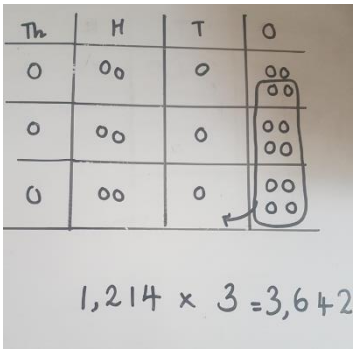
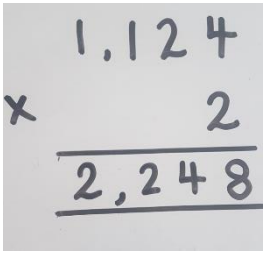
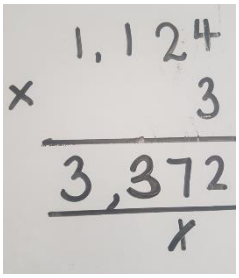
- Recall all multiplication facts up to 12x12
- Multiply 2 digits by 1 digit using the formal written method of short multiplication (same method as shown for 3 and 4 digit numbers.)
- Multiply 3 digits by 1 digit using the formal written method of short multiplication
- Multiply 4 digits by 1 digit using the formal written method of short multiplication
- Multiply by 10 and use this to calculate multiples of 10
- Use the distributive law e.g. 24 x 3 = (20 x 3) + (4 x 3)

Key Vocabulary

Multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative and product.

Objective	Concrete	Pictorial	Abstract
Multiply by 10 and use this to calculate multiples of 10	  Children should be able to use place value counters or dienes to represent a number and 'swap' the counters as eahc amount is made 10 times bigger. They can the look at the number that is being represented and use 0 as a place holder.  Children can then progress to using this to multiply other multiples of 10 using their times table knowledge. First they should multiply the number of	Children should be able to use place value charts in the classroom or draw their own with circles to represent the number that is being made times bigger. They can then increase each digit by moving it to the next column and use zero as a place holder.  Using the same place value chart or one drawn by themselves, children can then progress to using this to multiply other multiples of 10 using their times table knowledge. First they should multiply the number of tens by the single digit and then multiply that answer by 10 as shown in the image. 	Children must have a good understanding of multiplying by 10 and be able to do this proficiently. They must know that the number is getting 10 times bigger and 0 is used as a place holder rather than 'putting a zero on the end.' **40 x 7 =280** **4 x 7= 28** **28 x10 = 280**

	tens by the single digit and then multiply that answer by 10 as shown above.		
Use the distributive law.	Use the place Value counters or dienes to represent the number being multiplied and the amount of times it is multiplied by. Count how many ones there are and exchange if needed and then count the tens. Interpret the final amount at the answer.  	Use a place value chart from the classroom resources or draw a chart. Use circles to rpresent the number and repeat this to show how many times the number is being multiplied by. Total each coloumn and the add these totals together to find the overall total. Show the exchange as shown below.  	Partition the number into tens and ones Record the tens number that is being multiplied and the answer and then the ones beingmultipled. Recombine by adding both amounts tigetehr. Presetn as shown in the photograph so that children can use column addition to recombine. 
I can multiply a 3 digit number by a 1 digit number using a formal method.	Using place value counters or dienes, children should make the 3 digit number and repeat this for the number of times the number is being multiplied. They should then combine the tens and one and interpret the amount to find the answer. For larger numbers, children will  need to exchange as taught in year 3.	Children can use place value grids to represent three digit numbers. They should draw circles to represent the number and then repeat to show how many times the number is mutliplied. The hundreds, tens and ones can then be combined to find the answer. Children should be taught to begin the calcualtion with the ones in preparation for form method.  For larger numbers, children will show the exchange as shown below. 	Children to write each digit in the correct column according to its value. Children to begin multiplying with the lowest value digit, in this case the ones. Begin with calculations that do not involve exchange. Progress to 1 exchange in the ones column. Ensure the exchanged digit is crossed out to show it has been added. Further exchanges in the tens and hundreds column can then be used. Ensure zero is used a place holder.  
I can multiply a	Using place value counters or dienes, children should make the 3 digit number and repeat this for	Children can use place value grids to represent four digit numbers. They should draw circles to represent the number and	Children to write each digit in the correct column according to its value.

4 digit number by a 1 digit number using a formal method.	the number of times the number is being multiplied. They should then combine the tens and one and interpret the amount to find the answer. For larger numbers, children will need to exchange as taught in year 3. 	then repeat to show how many times the number is mutliplied. The thousands, hundreds, tens and ones can then be combined to find the answer. Children should be taught to begin the calcualtion with the ones in preparation for form method. For larger numbers, children will show the exchange as shown below.  	Children to begin multiplying with the lowest value digit, in this case the ones. Begin with calculations that do not involve exchange. Progress to 1 exchange in the ones column. Ensure the exchanged digit is crossed out to show it has been added. Further exchanges in the tens and hundreds column can then be used. Ensure zero is used a place holder.  

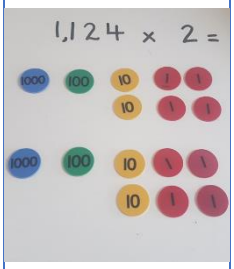
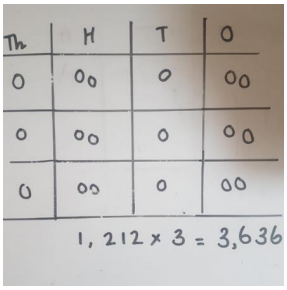
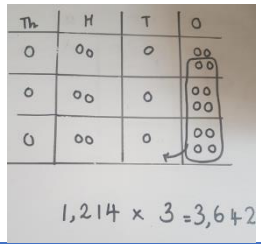
MULTIPLICATION YEAR 5

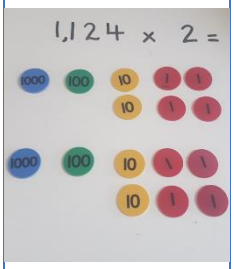
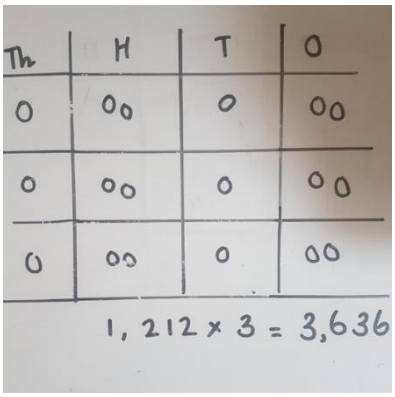
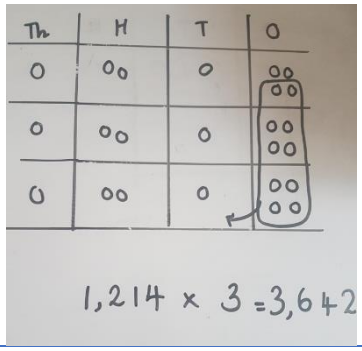
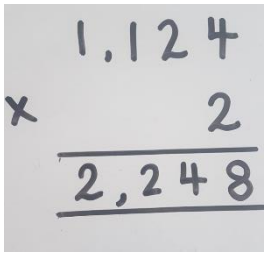
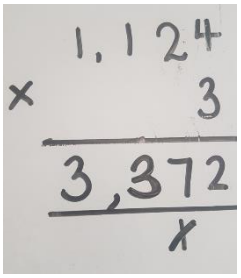
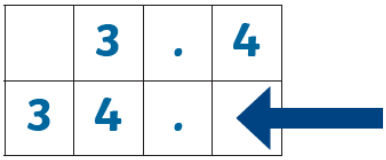
Expectations

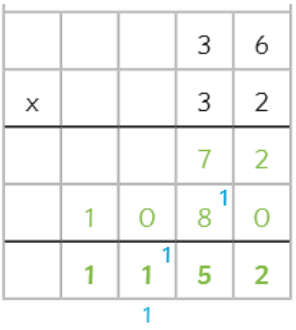
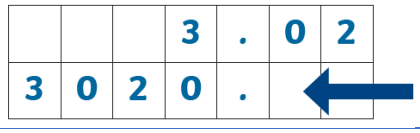
- Multiply up to 4 digit numbers by a single digit using the grid method
- Multiply up to 4 digits by 1 digit using the formal written of short multiplication
- Multiply whole numbers and decimals by 10
- Multiply up to 2 digits by 2 digits using the grid method
- Multiply 2 digits by 2 digits using the formal written method of long multiplication
- Multiply whole numbers and decimals by 1000

Key Vocabulary

Multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, expanded column multiplication, partition, commutative, associative and product.

Objective	Concrete	Pictorial	Abstract
Multiply up to 4 digit numbers by a single digit using the grid method	Using place value counters or dienes, children should make the 3 digit number and repeat this for the number of times the number is being multiplied. They should then combine the tens and one and interpret the amount to find the answer. For larger numbers, children will need to exchange as taught in previous years 	Children can use place value grids to represent four digit numbers. They should draw circles to represent the number and then repeat to show how many times the number is mutliplied. The thousands, hundreds, tens and ones can then be combined to find the answer. Children should be taught to begin the calcualtion with the ones in preparation for form method. For larger numbers, children will show the exchange as shown below.  	Children will use a grid or be given a pre-drawn grid. The will be experienced at partioning numbers. They will write the numbers into the grid showing the partitioned 4 digit number. 0 must be used as a place holder. Multipliy the one digit number by the ones first, followed y the tens, hundreds and thousands. The numbers within the grid can then be recombined to find the answer. 6139 × 7 = | × | 6000 | 100 | 30 | 9 | | 7 | 42,000 | 700 | 210 | 63 | 42,000 + 700 + 210 + 63 = 42,973
Multiply up to 4 digits by 1 digit using the formal written	Using place value counters or dienes, children should make the 3 digit number and repeat this for the number of times the number is being	Children can use place value grids to represent four digit numbers. They should draw circles to represent the number and then repeat to show how many times the number is mutliplied. The thousands, hundreds, tens and ones can then be combined to find the answer. Children	Children to write each digit in the correct column according to its value. Children to begin multiplying with the lowest value digit, in this case the ones. Begin with calculations that do not involve exchange.

of short multiplication	multiplied. They should then combine the tens and one and interpret the amount to find the answer. For larger numbers, children will need to  exchange as taught in year 3 and 4	should be taught to begin the calcualtion with the ones in preparation for form method. For larger numbers, children will show the exchange as shown below.   	Progress to 1 exchange in the ones column. Ensure the exchanged digit is crossed out to show it has been added. Further exchanges in the tens and hundreds column can then be used. Ensure zero is used a place holder.  
Multiply whole numbers and decimals by 10		Children can use place value grids to represent the decimal number. Each digit moves three places to the left because the number is being increased.  	Children will progess to increasing the sze of each digit by 10 without the need of a grid. **3.4 x 10 = 34**
Multiply up to 2 digits by 2 digits using the grid method			Children will use a grid or be given a pre-drawn grid. The will be experienced at partioning 2 digit numbers into tens and ones. They will write the numbers into the grid showing both partitioned 2 digit numbers. 0 must be used as a place holder. Multipliy the one digit number by the ones first and then the ten. The numbers within the grid can then be recombined to find the answer. 65 × 47 = × 60 5 40 2,400 200 7 420 35 **2,400 + 420 + 200 + 35 = 3,055**

Multiply 2 digits by 2 digits using the formal written method of long multiplication			Children to write each digit in the correct column according to its value. Children to begin multiplying with the lowest value digit, in this case the ones. Ensure zero is used a place holder. 
Multiply whole numbers and decimals by 1000		Children can use place value grids to represent the decimal number. Each digit moves three places to the left because the number is being increased.  	Children will progess from multipying decimals by 10 to increasing the sze of each digit by 1,000 without the need of a grid. **3.02 x 1000 = 3020**

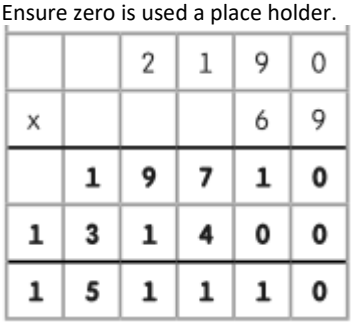
MULTIPLICATION YEAR 6

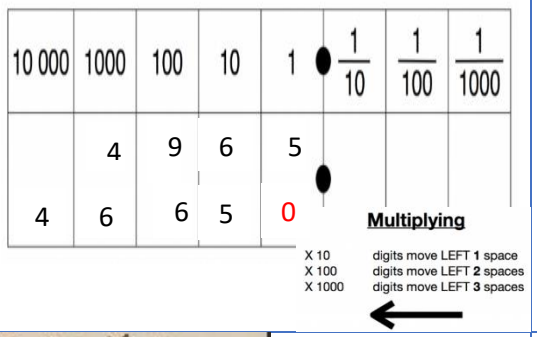
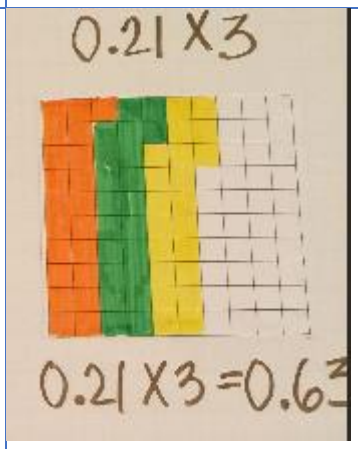
Expectations

- Multiply up to 4 digit numbers by a 2 digit using the formal method of long multiplication.
- Multiply any number by 10, 100 and 1,000.
- Multiply a decimal to one decimal place by a single digit using the formal written method of short multiplication.
- Multiply a decimal to two decimal place by a single digit using the formal written method of short multiplication.

Key Vocabulary

Multiply, times, groups of, equal groups of, multiple of, multiplied by, estimate, inverse, grid multiplication, decimal, one decimal place, two decimals places, expanded column multiplication, partition, commutative, associative and product.

Objective	Pictorial	Abstract
Multiply numbers up to 4 digits by a 2 digit number using the formal written method of long multiplication		Children to write each digit in the correct column according to its value. Children to begin multiplying with the lowest value digit, in this case the ones. Ensure zero is used a place holder.  2 1 9 0 x 6 9 1 9 7 1 0 1 3 1 4 0 0 1 5 1 1 1 0
Multiply any number by 10, 100, 1000	Children can use place value grids to represent the number being multiplied. To multiply by 10, each digit moves one place to the left because the number is being increased by 10. To multiply by 100, each digit moves two places to the left because the number is being increased by 100. To multiply by 1,000, each digit moves three places to the left because the number is being increased by 1,000.	Children will progess from multipying numbers by 10 to increasing the sze of each digit by 1,000 without the need of a grid.

	0 should be used as a place holder.  	
Multiply a decimal to one decimal place by a single digit using the formal written method of short multiplication	 Shade the decimal on a 100 grid. Repeat this for the number of times the decimal is being mutliplied. **Bar Model** **0.21 x 3** **0.21** | **0.21** | **0.21**	Write the numbers in coloumns. Begin multiplying the single digit number by the tenths. Show the regrouping underneath and then repeat for the ones. Add on any numbers which have been regrouped. Ensure the deicmal point is added in the correct place. 3.7 x 6 = 22.2 3 . 7 × 6 2 2 . 2 4
Multiply a decimal to two decimal place by a single digit using the formal written method of short multiplication		Write the numbers in coloumns. Begin multiplying the single digit number by the hundredths and then the tenths. Show the regrouping underneath and then repeat for the ones. Add on any numbers which have been regrouped. Ensure the deicmal point is added in the correct place. £ 1 • 5 4 × 6 £ 9 • 2 4 3 2

DIVISION YEAR 3

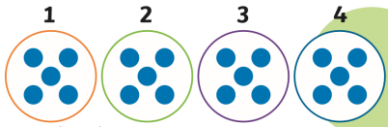
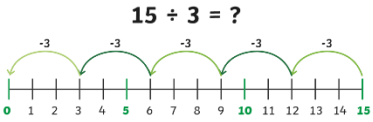
Expectations

- Divide a 2 digit number by a 1 digit number using a number line (repeated subtraction)

Key Vocabulary

Divided by, divide, divided into, grouping, divisor, short division, remainder and inverse.

quotient
divisor)dividend

Objective	Concrete	Pictorial	Abstract
Divide a 2 digit number by a 1 digit number using a number line (repeated subtraction)	Children to have cubes, counters. They should find the amount need to represent the dividend (number being divided). They should then take away the divisor (number being divided by). Once all the counters have been taken away, children should count the number of groups. 	Using the same concept as the concrete method, children will draw their own spots to divide. They will draw the total number of spots to represent the dividend and then take away the divisor.	Children can draw their own number line or use one from the clasroom.  They should begin at the dividend and do one large jump to represent the divisor. For example, if the divisor is 3, the large jump backwards will represent 3 steps. Repeat this until you get to zero.

DIVISION YEAR 4

Expectations

Children in year 4 will solve correspondence problems and mentally recall division facts.

There is no formal method of teaching division in year 4.

DIVISION YEAR 5

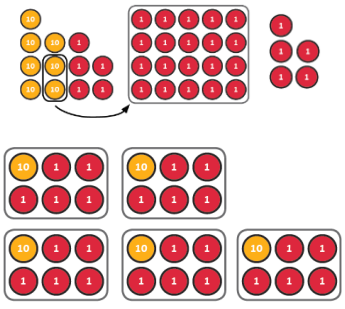
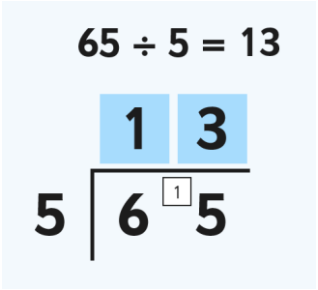
Expectations

- Divide 2 digits by 1 digit using the formal written method of short division and express the remainder as a fraction or decimal
- Divide whole numbers and decimals by 10
- Divide 3 digits by 1 digit using the formal written method of short division and express the remainder as a fraction or decimal
- Divide whole numbers and decimals by 100
- Divide whole numbers and decimals by 1000

Key Vocabulary

Divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, ones, tenths, scaling and short division.

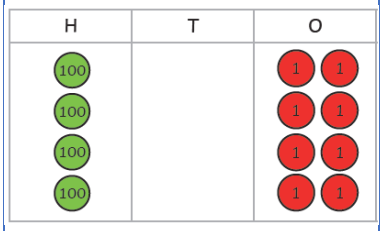
quotient
divisor)dividend

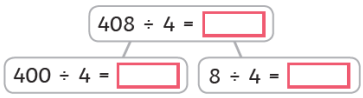
Objective	Pictorial	Concrete	Abstract
Divide 2 digits by 1 digit using the formal written method of short division and express the remainder as a fraction or decimal	Children use place value counters to represent the dividend. Children to share into groups according to the divisor. In this example, the divisor is 5 so the counters are shared into 5 groups. Children must take account of the value shown by each counters and not just share the counters as if they all equal 1. If there is a remainder of tens that cannot be shared, these must be exchanged for ones and then shared. 	Using the same concept as the concrete method, children will draw their own spots to divide. They will draw the total number of spots to represent the dividend group them accoridng to the divisor.	Children to present the calculation with as shown below. Begin with the hundreds number. First ask how many 5's there are in 6? The answer is 6 with 1 left over. The numbers left over are written small next to the next digit in the calculation, in this case, the 5. Now ask how many 5's are in 15 The answer is 3. The answer is then read by looking at the digits above the line. 

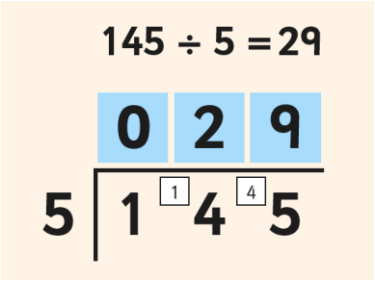
<table>
<tr>
<td>Divide whole numbers and decimals by 10</td>
<td colspan="2">Children can use place value grids to represent the number being divided. To divide by 10, each digit moves one place to the right because the number is being made 10 times smaller. 0 should be used as a place holder.

Use place value to work out how to divide in 10s
674 ÷ 10 = ?
If you divide a number by 10, the digits move one place value to the right.
<table>
<tr><th>Hundreds</th><th>Tens</th><th>Units</th><th>Tenths</th><th>Hundredths</th></tr>
<tr><td>6</td><td>7</td><td>4</td><td></td><td></td></tr>
<tr><th>Hundreds</th><th>Tens</th><th>Units</th><th>Tenths</th><th>Hundredths</th></tr>
<tr><td></td><td>6</td><td>7</td><td>4</td><td></td></tr>
</table>
674 ÷ 10 = 67.4</td>
<td>Children will progess to dividing numbers by 10 without the need for a grid.

674 ÷ 10 = 67.4</td>
</tr>
<tr>
<td>Divide 3 digits by 1 digit using the formal written method of short division and express the remainder as a fraction or decimal</td>
<td>Children use place value counters to represent the dividend. Children to share into groups according to the divisor. In this example, the divisor is 4 so the counters are shared into 4 groups. Children must take account of the value shown by each counters and not just share the counters as if they all equal 1. If there is a remainder of tens or hundreds that cannot be shared, these must be exchanged for tens or ones accordingly and then shared.

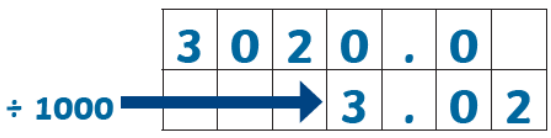
408÷4=
 
</td>
<td>Children to draw part whole models to partition the number and divide each part. The answers can then be recombined.

 
</td>
<td>Children to present the calaucaltion with as shown below.
Begin with the hundreds number. First ask how many 5’s there are in 1? The answer is 0 with 1 left over. The numbers left over are written small next to the next digit in the calculation, in this case, the 4. Now ask how many 5’s are in 14. The answer is 2 but with 4 left over. This 4 gets written next to the next number in the calculation. Now ask how many 5’s are in 45? The answer is 9. The answer is then read by looking at the digits above the line.

 
</td>
</tr>
<tr>
<td>Divide whole numbers and decimals by 100</td>
<td colspan="2">Children can use place value grids to represent the number being divided. To divide by 100, each digit moves two places to the right because the number is being made 100 times smaller.
0 should be used as a place holder.

If you divide a number by 100, the digits will move two places to the right.
<table>
<tr><th>Hundreds</th><th>Tens</th><th>Units</th><th>Tenths</th><th>Hundredths</th></tr>
<tr><td>6</td><td>7</td><td>4</td><td></td><td></td></tr>
<tr><th>Hundreds</th><th>Tens</th><th>Units</th><th>Tenths</th><th>Hundredths</th></tr>
<tr><td></td><td></td><td>6</td><td>7</td><td>4</td></tr>
</table>
674 ÷ 100 = 6.74</td>
<td>Children will progess to dividing numbers by 10 without the need for a grid.

674 ÷ 100 = 6.74</td>
</tr>
<tr>
<td>Divide whole numbers and decimals by 1,000</td>
<td colspan="2">Children can use place value grids to represent the number being divided. To divide by 1,000, each digit moves three places to the right because the number is being made 1,000 times smaller. 0 should be used as a place holder.

 
</td>
<td>Children will progess to dividing numbers by 10 without the need for a grid.

3020 ÷ 1,000 = 3.02</td>
</tr>
</table>

DIVISION YEAR 6

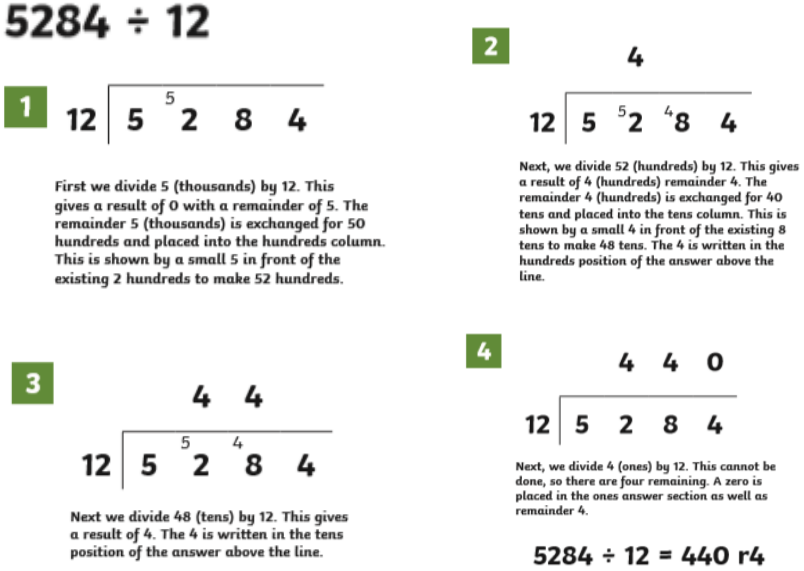
Expectations

- Divide numbers up to 4 digits by a one or two digit number using the method of chunking
- Divide numbers up to 4 digits by a 1 or 2 digit number using the formal written method of short division where appropriate
- Divide by 10, 100, 1000 giving answers up to 3 decimal places
- Use written division methods in cases where the answer has up to two decimal places
- Divide numbers up to 4 digits by a one or two digit number using the formal written method of long division

Key Vocabulary

Divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, ones, tenths, hundredths, scaling, long division, short division and formal written methods.

$$\text{divisor} \overline{)\text{dividend}} \quad \text{quotient}$$

Objective	Abstract
Divide numbers up to 4 digits by a one or two digit number using the method of chunking	156 ÷ 9 = 17 r 3 Write in the division format: 9)156 Use known multiplication facts: -90 = 10 × 9 subtract 66 Use known facts: -45 = 5 × 9 subtract 21 Use known facts: -18 = 2 × 9 subtract 3 Add number of times the divisor has been used: = 17 × 9
Divide numbers up to 4 digits by a 1 or 2 digit number using the formal written method of short division where appropriate	
Divide by 10, 100, 1000 giving	Children can use place value grids to represent the number being divided. To divide by 10, each digit moves one space to the right because the number is being made 10 times smaller. To divide by 100, each digit moves two

answers up to 3 decimal places

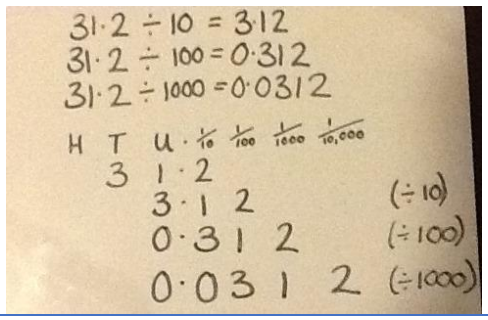
places to the right because the number is being made 100 times smaller. To divide by 1,000, each digit should be moved 3 spaces to the right because the number is being made 1,000 times smaller. 0 should be used as a place holder. Once secure, children will be able to complete this without the need for a place value grid.

If you divide a number by 100, the digits will move two places to the right.

Hundreds	Tens	Units	Tenths	Hundredths
6	7	4		

Hundreds	Tens	Units	Tenths	Hundredths
		6	7	4

674 ÷ 100 = 6.74



Divide numbers up to 4 digits by a one or two digit number using the formal written method of long division

591 ÷ 12

answer section

1

```
      4
12 | 5 9 1
     4 8
     1 1 1
```

First, work out how many 12s there are in 59. The answer to this question is 4, which is written above the 9. We then write the product of 4 and 12 (48) under 59 and subtract giving 11. The 1 is then brought down and written next to 11 to make 111.

answer section

2

```
      4 9
12 | 5 9 1
     4 8
     1 1 1
     1 0 8
         3
```

Next, work out how many 12s there are in 111. The answer to this question is 9, which is written above the 1. Then, write the product of 9 and 12 (108) under 111 and subtract it, giving 3.

answer section

3

```
      4 9 .
12 | 5 9 1 . 0 0
     4 8
     1 1 1
     1 0 8
         3 . 0
```

Extend 591 into decimals to continue the process of long division.
The 0 in the tenths place is then brought down and written next to 3 to make 30.