St. Philomena's Catholic Primary School

Headteacher: Miss V Maher

St. Philomena's Catholic Primary School

Calculation Policy

This policy sets out the path of progression for maths within St. Philomena's School. It outlines the various calculation methods that children are taught as they progress through the school. This helps them build up a bank of strategies that can be applied when appropriate. Each strategy can be refined and extended to suit the calculation needed.

When faced with a calculation problem children will be encouraged to ask:

- Can I do this in my head?
- Could I do this in my head using drawings or jottings to help me?
- Do I need to use a written method?
- Which method would be most efficient?
- Is the answer sensible?

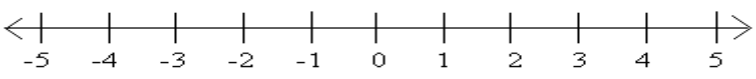
The Use of Number Lines

Number lines are a very important tool used in all calculations. Children are introduced to them right from their first year of schooling.

Number lines can take many formsand are used in a variety of ways to develop children's understanding of number. Children become proficient in making 'jumps' up and down a number line to help them solve a mathematical problem.

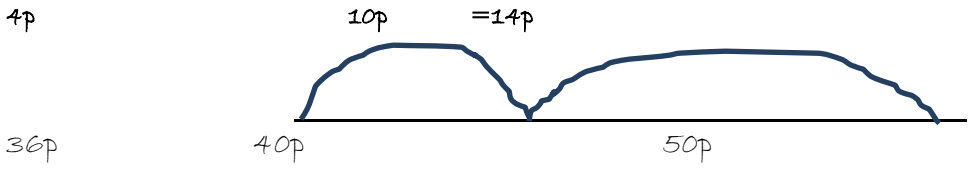
1	2	3	4	5	6	7	8	9	10

All classes have access to number lines of various types appropriate to their age group, including those incorporating negative numbers.



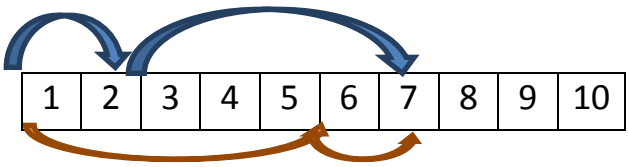
As they progress through the school the children are taught the value of drawing a blank/empty number line that can accommodate relevant numbers to solve calculations.

e.g finding change from 50p after spending 36p.

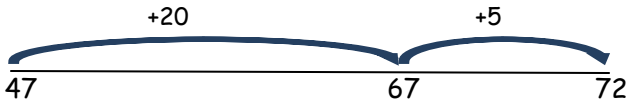


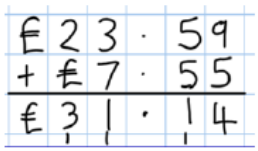
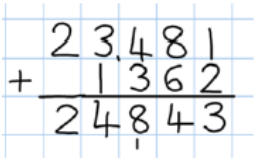
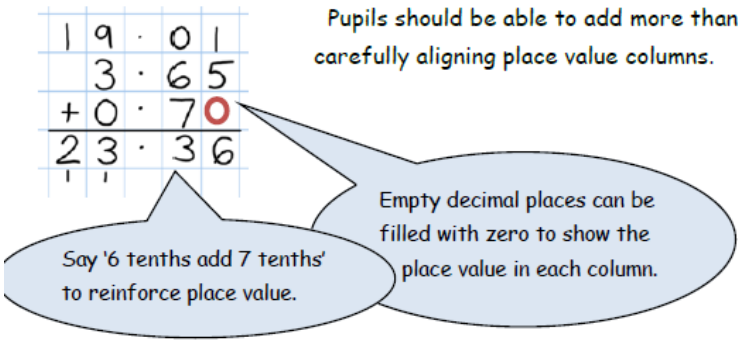
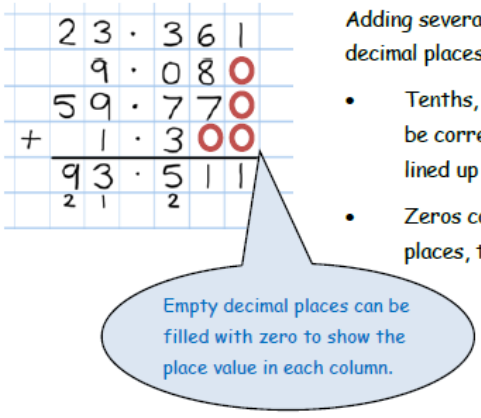
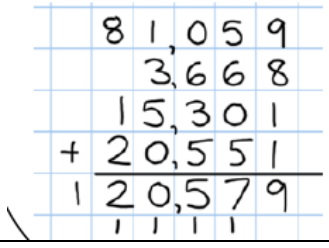
Addition

Children are taught to understand addition as combining sets and counting on. Calculations are put into practical contexts so that the child sees the relevance of the method they are learning.

<table>
<tr>
<td rowspan="3">Stage 1</td>
<td>2+3=
At a party, I eat two cakes and my friend eats three. How many cakes did we eat altogether?
  </td>
<td>Children could draw a picture to help them work out the answer or use practical equipment to model the problem</td>
</tr>
<tr>
<td>6+5 =
Six people are on the bus. Five more people get on at the next stop. How many people are on the bus now?
 
Or
||||||||||</td>
<td>Children could use dots or tally marks to represent objects.</td>
</tr>
<tr>
<td>5+2 =
What is the total of the numbers on these two dice?
 
 

2 + 5 = 7 or 5 + 2 = 7</td>
<td>Children can count along a number line, making jumps to reach the answer. They can also see that addition can be done in any order, developing awareness that it is often more efficient to put the larger number first.</td>
</tr>
</table>

Stage 2	**47 + 25 =** My sunflower is 47 cm tall. My friend's is 25 cm taller. How tall is my friend's sunflower?  	Drawing an empty number line helps children to record the steps they have taken in a calculation. Start on 47, +20, +5. This is more efficientthan counting on in ones. Empty number lines can be used with numbers of any size.
	87 + 64 = One shelf measures 87 cm and another shelf measures 64 cm. what is their total length in cm and m? **(80 + 60) + (7 + 4)** **140 + 11** **= 151cm or 1.51m** Or **80 + 60 = 140** **7 + 4 = 11** **151**	By **partitioning(splitting)** both numbers into tens and units. Each part can be added separately and then the answers combined to give the total.
Stage 3	**487 + 546 =** There are 487 boys and 546 girls in a school. How many children are there altogether? **546** **+ 4 8 7** **9 0 0** **1 2 0** **1 39 0 0** **1 0 3 3 1 0 3 3** **5 4 6** **or** **4 8 7** **1 3** **1 2 0**	Children are taught written methods for those calculations they cannot do in their heads. Expanded methods build on mental methods and make the value of the digits clear to children. The language used is very important – 500 + 400, 40 + 80, 6 + 7 and then 900+ 120+ 13 OR starting with the units, tens and then the hundreds. Children are taught the importance of placing digits with the same value underneath each other in clear columns.
Stage 4	**2685 + 1746 =** 2685 people visited the museum last year. The number of visitors increased by 1746 this year. How many people visited this year? **2 6 8 5** **+ 1 7 4 6** **4 4 3 1** 1 1 1	Children move on to using more compact standard written methods when they are secure with their understanding of place value. The units column is added first with the ten carried over and placed underneath

		the tens column. The tens column is added first with the hundred carried over and placed underneath the hundreds column. The same process is repeated with the hundreds column and then the thousands column is added up.
Stage 5	 The decimal point should be aligned in the same way as the other place value columns, and must be in the same column in the answer.  Numbers should exceed 4 digits.  Pupils should be able to add more than two values, carefully aligning place value columns. Say '6 tenths add 7 tenths' to reinforce place value. Empty decimal places can be filled with zero to show the place value in each column.  Adding several numbers with different numbers of decimal places (including money and measures): • Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row. • Zeros could be added into any empty decimal places, to show there is no value to add. Empty decimal places can be filled with zero to show the place value in each column.  Adding several numbers with more than 4 digits.	Children add numbers with more than 4 digits including money, measures and decimals with different numbers of decimal places. Children will progress to adding several numbers of increasing complexity (including tenths, hundredths and thousandths).

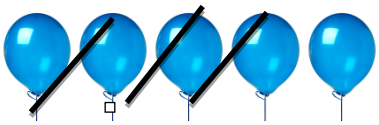
	Addition Key Vocabulary
Year 1	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line **Key skills for addition at Y1:** • Read and write numbers to 100 in numerals, incl. 1—20 in words • Recall bonds to 10 and 20, and addition facts within 20 • Count to and across 100 • Count in multiples of 1 2, 5 and 10 • Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations. **Video clips: Using a range of equipment and strategies to reinforce addition statements / bonds to 10**
Year 2	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary **Key skills for addition at Y2:** • Add a 2-digit number and ones (e.g. 27 + 6) • Add a 2-digit number and tens (e.g. 23 + 40) • Add pairs of 2-digit numbers (e.g. 35 + 47) • Add three single-digit numbers (e.g. 5 + 9 + 7) • Show that adding can be done in any order (the commutative law). • Recall bonds to 20 and bonds of tens to 100 (30 + 70 etc.) • Count in steps of 2, 3 and 5 and count in tens from any number. • Understand the place value of 2-digit numbers (tens and ones) • Compare and order numbers to 100 using <> and = signs. • Read and write numbers to at least 100 in numerals and words. • Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.
Year 3	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, **hundreds boundary, increase, vertical, carry, expanded, compact** **Key skills for addition at Y3:** • Read and write numbers to 1000 in numerals and words. • Add 2-digit numbers mentally, incl. those exceeding 100. • **Add a three-digit number and ones mentally (175 + 8)** • **Add a three-digit number and tens mentally (249 + 50)** • **Add a three-digit number and hundreds mentally (381 + 400)** • Estimate answers to calculations, using inverse to check answers. • Solve problems, including missing number problems, using • number facts, place value, and more complex addition. • Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.) • Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

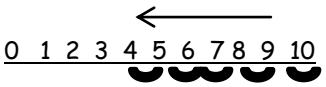
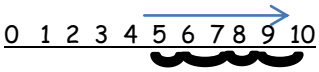
Year 4	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, „carry", expanded, compact, **thousands, hundreds, digits, inverse** **Key skills for addition at Y4:** • Select most appropriate method: mental, jottings or written and explain why. • Recognise the place value of each digit in a four-digit number. • Round any number to the nearest 10, 100 or 1000. • Estimate and use inverse operations to check answers. • Solve 2-step problems in context, deciding which operations and methods to use and why. • Find 1000 more or less than a given number. • Continue to practise a wide range of mental addition strategies, ie. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining. • Add numbers with up to 4 digits using the formal written method of column addition • Solve 2-step problems in contexts, deciding which operations and methods to use and why. • Estimate and use inverse operations to check answers to a calculation.
Year 5	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry", expanded, compact, vertical, thousands, hundreds, digits, inverse &**decimal places, decimal point, tenths, hundredths, thousandths** **Key skills for addition at Y5:** • Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies ie. add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds. • Use rounding to check answers and accuracy. • Solve multi-step problems in contexts, deciding which operations and methods to use and why. • Read, write, order and compare numbers to at least 1 million and determine the value of each digit. • Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000. • Add numbers with more than 4 digits using formal written method of columnar addition.
Year 6	**Key vocabulary**: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry", expanded, compact, vertical, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths **Key skills for addition at Y6:** • Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies. • Solve multi-step problems in context, deciding which operations and methods to use and why. • Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

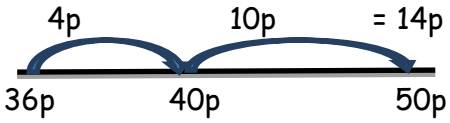
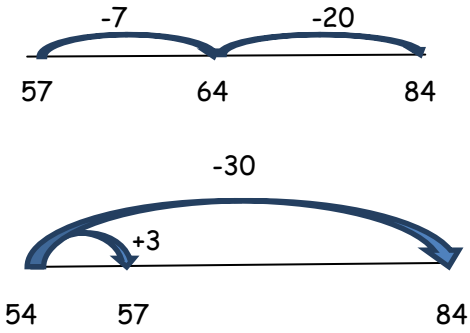
	• Read, write, order and compare numbers up to 10 million and determine the value of each digit. • Round any whole number to a required degree of accuracy. • Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

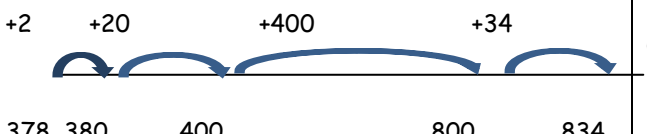
Subtraction

Children are taught to understand subtraction as taking away (counting back) and finding the difference (counting on/up). Calculations are put into practical contexts so that the child sees the relevance of the method they are learning. Children should from the very beginning be encouraged to count backwards as well as counting forwards, often this could be as part of a rhyme, song or game.

			Mental Strategies
Stage 1	**5 – 3 =** I had 5 balloons. Two of them burst. How many do I have left?  *Take Away* A teddy bear costs £5 and a ball costs £2. How much more does the bear cost?   *Find the difference*	Drawing a picture helps children to visualise the problem. The use of practical equipment, such as bricks, helps to model the problem.	Children should start recalling subtraction facts up to and within 10 and 20, and should be able to subtract 0.
	8 – 3 = We baked eight biscuits. I ate three. How many were left?  *Take away* Lisa has eight felt tip pens and Tim has three. How many more does Lisa have?  *Find the difference*	Using dots and tally marks is quicker than using a picture.	

	9-5 = I had nine pence. I spent five pence. How much did I have left?  	The number line is used for counting back or jumping back  The number line can also be used for counting on.	

Stage 2	**50-36 =** I spent 36p in a shop. How much change did I get from 50p? 36p + ___p= 50p  	Counting on using a numberline is particularly useful in calculating change.	Subtract numbers close together by counting on.
	84-27 = I cut 27cm off a ribbon measuring 84cm. how much is left?  	Children can count back using an empty number line. This is a good way to record the steps they have taken and shows their understanding of how numbers can be partitioned [split]to make a calculation easier-[start on 84, -20,-7] Children can also use the compensation method – taking away too much and adding back. In this example, -30 and +3 back on.	
	754 – 86= 754 cars were waiting to load onto the car ferry. 86 drove on. How many were still waiting? 754 = 700 + 50+ 4	Children progress onto subtraction using decomposition – where there are fewer units, tens, hundreds etc in	

	86 80 + 6 = 700 + 40 + 14 → 7 4 ^{1}4 80 + 6 8 6 = 600 + 140 + 14 → 6 ^{1}4 ^{1}4 80 + 6 8 6 600 + 60 + 8 6 6 8	the larger number. The use of the expanded written method helps them understand the process and they then move onto the more compact standard written method for decomposition. Starting with the units, 4-6, we can't do, so we carry over or exchange a ten to make 14 units leaving 4 tens. 14 – 6 equals 8 units. Moving onto the tens column, 4 tens subtract 8 tens we can't do, so we carry over a hundred to make 14 tens leaving 6 hundreds. Now 14 tens subtract 8 tens equals 6 tens. Finally the hundred column, 6 hundreds subtract nothing equals 6 hundreds.	
Stage 3	**834-378** = The library owns 834 books. 378 are out on loan. How many are left on the shelves?  2 2 0 + 4 0 0 3 4 4 5 6	Children can count up from the smallest number to the biggest using an empty line. It is easiest to count up to a multiple of 10 or 100 ['friendly numbers']. The steps can also be recorded vertically. Making sure the digits of the same value are always underneath each other.	Continue to reinforce counting on. Begin to use estimation to check answers.

Stage 4	**2006 – 1998** = Sarah was born in 2006 and Mark in 1998. How much older is Mark than Sarah? +2 +6	Using the number line and the counting on method is particularly helpful when numbers	Encourage children to consider the best method for

		are actually quite close but cross a tens, hundreds or thousands barrier and so look harder than they actually are.	the number involved.
Stage 5	**6463 – 2686 =** The second hand car cost £6463. The teacher only had £2686. How much did she need to borrow to pay for the car? $^{5}\not{6}\ ^{13}\not{4}\ ^{15}\not{6}\ ^{1}3$ $-\underline{2\ 6\ 8\ 6}$ $\underline{3\ 7\ 7\ 7}$	Decomposition can be used with any numbers provided the child has checked that a mental strategy or number line method would not be more efficient. Children are encouraged to see that by adding the answer to what was taken away they will end up with what they started with - a bit of maths magic.	Deepen understanding of approximation and understanding. Apply range of mental strategies.

	Subtraction Key Vocabulary
Year 1	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? **Key skills for subtraction at Y1:** • Given a number, say **one more or one less.** • Count to and over 100, **forward and back**, from any number. • Represent and use **subtraction facts to 20 and within 20**. • Subtract with **one-digit and two-digit** numbers to 20, including zero. • Solve one-step problems that involve addition and subtraction, using concrete objects (iebead string, objects, cubes) and pictures, and missing number problems. • Read and write numbers from 0 to 20 in numerals and words.
Year 2	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? **difference, count on, strategy, partition, tens, units** **Key skills for subtraction at Y2:** • Recognise the place value of each digit in a two-digit number. • Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100. • Subtract using concrete objects, pictorial representations, 100 squares and mentally, including: a two-digit number and ones, a two-digit number and tens, and two two-digit numbers. • Show that subtraction of one number from another cannot be done in any order. • Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems. • Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods. • Read and write numbers to at least 100 in numerals and in words.
Year 3	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units **exchange, decrease, hundreds, value, digit** **Key skills for subtraction at Y3:** • Subtract mentally a: **3-digit number and ones, 3-digit number and tens, 3-digit number and hundreds** . • Estimate answers and use inverse operations to check. • Solve problems, including missing number problems. • Find 10 or 100 more or less than a given number. • Recognise the place value of each digit in a 3-digit number . • Counting up differences as a mental strategy when numbers are close together or near multiples of 10 (see examples above) • Read and write numbers up to 1000 in numerals and words. • Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21), and select most appropriate methods to subtract, explaining why.

Year 4	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance be-tween, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, **inverse** **Key skills for subtraction at Y4:** Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc. • Children select the most appropriate and efficient methods for given subtraction calculations. • Estimate and use inverse operations to check answers. • Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why. • Solve simple measure and money problems involving fractions and decimals to two decimal places. • Find 1000 more or less than a given number. • Count backwards through zero, including negative numbers. • Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000 • Solve number and practical problems that involve the above, with increasingly large positive numbers.
Year 5	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, **tenths, hundredths, decimal point, decimal** **Key skills for subtraction at Y5:** • Subtract numbers mentally with increasingly large numbers. • Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy. • Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why. • Read, write, order and compare numbers to at least 1 million and determine the value of each digit. • Count forwards or backwards in steps of powers of 10 for any given number up to 1 million. • Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0. • Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.
Year 6	**Key vocabulary**: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal **Key skills for subtraction at Y6:** • Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why. • Read, write, order and compare numbers up to 10 million and determine the value of each digit. • Round any whole number to a required degree of accuracy. • Use negative numbers in context, and calculate intervals across zero. • Children need to utilise and consider a range of mental subtraction strategies, jottings and

	written methods before choosing how to calculate.

Multiplication

Times Tables

A good knowledge and quick recall of times tables is essential to children's mathematical progress. The children are taught up to 12x12. The target is for children to know all their tables by the end of Year 4.

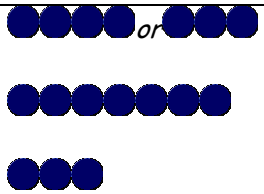
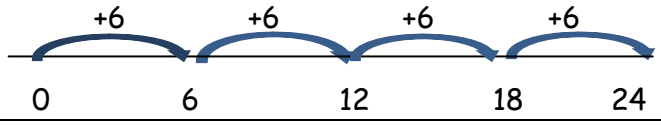
When learning tables, children are encouraged to look for patterns. They are also taught to recognise the reversible effect so they know that 6 x 2 is the same as 2 x 6. They are also taught the relationship with division so that knowing 6 x 2 = 12 means they also know that 12÷2 = 6 and 12÷6 = 2.

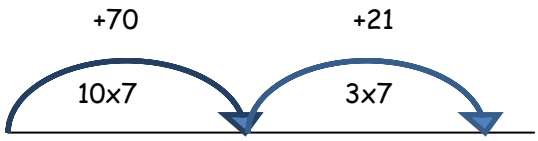
So each known times tables fact they also know three others!

Multiplication Methods

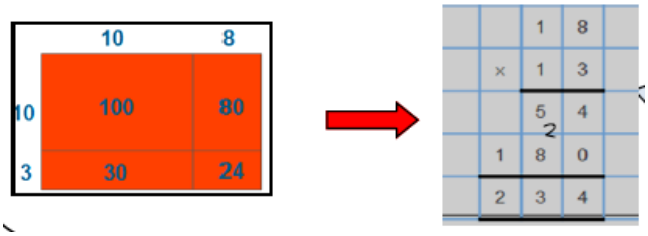
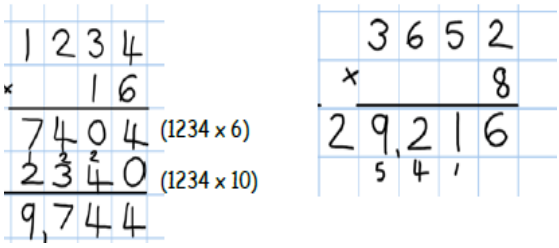
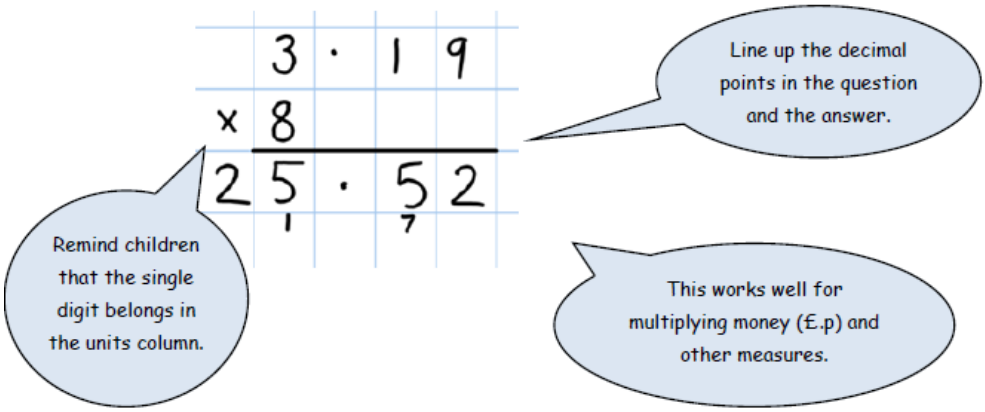
Children are taught to understand multiplication as repeated addition and scaling.it can also describe an array. Calculations are put into practical contexts so that the child sees the relevance of the method they are learning.

			Mental Recall
Stage 1	**2 x 4 =** Each child has 2 eyes. How many eyes do 4 children have?  2 + 2 + 2 + 2	Drawing a picture is a helpful way to visualise a problem	Children should become confident in counting in 2s.
Stage 2	**5 x 3 =** There are 5 cakes in a pack. How many in three packs?  5 + 5 + 5	Dots or tally marks are often drawn in groups. This shows three lots of five. The children can clearly see the repeated addition.	Children should begin to recall multiplication facts for 2, 5 and 10 times tables.
Stage 3	***4x 3 =*** A chew cost 4 pence. How much do 3 chews cost? 	Drawing an array (3 rows of 4 or 3 columns of 4) gives children an image of the answer. It also	Work out multiplication facts not known by repeated addition or commutative law (i.e. 4x3 is the same as

	 **6 x 4 =** There are four cats. Each cat has six kittens. How many kittens are there altogether?  	helps the understanding that 4x3 is the same as 3x4. Children can count on in equal steps recording each jump on an empty number line. This shows jumps of six.	3x4).

	13 x 7= There are 13 biscuits in a packet. How many biscuits in 7 packets?  13 x 7 = (10 x 7) + (3 x 7) = 70 + 21 = 91	When numbers get bigger, it is inefficient to do lots of smaller jumps. 13 can be partitioned (split) into 10 and 3. The calculation can be worked out on a number line or horizontally.	
	23 x 8 = X | 20 | 3 8 | 160 | 24	This is called the Grid Method. Children begin to use this method by multiplying a 2 digit number with a single digit number.	Encourage pupils to partition numbers to aid multiplication. Continue to approximate or estimate before calculating to check and aid working out.
Stage 4	6 x 124 = 124 books were sold. Each book cost £6. How much money was taken? X | 100 | 20 | 4 6 | 600 | 120 | 24 | | | | 600+ 120+ 24= 744	Children progress to 124 is partitioned (split) into hundreds, tens and units. Each part is then multiplied by 6. The answers are then added together mentally or set out vertically.	

	72 x 34= A cat is 72cm long. A tiger is 34 times longer. How long is the tiger? X | 70 | 2 30 | 2100 | 60 24 | 280 | 8 2100 + 60 = 2160 280 + 8 = 288 2448	The grid method also works for 'long multiplication'. The numbers are partitioned (split up) and each part is multiplied separately and then each answer is added together. The grid method can be used for numbers of any size.	
Stage 4	**28 x 7=** In a school there were seven classes each with 28 children. How many children were in the school? 2 8 x 7 x 7 5 6 (8 x 7) ⟶ + 1 4 0 (20 x 7) 1 9 6 2 8 1 9 6 5	From the grid method, the children begin to use more standard written methods, working vertically. Children are reminded that digits of the same value must be underneath each other. Starting with the units, 8x7 =56. The 6 goes into the units column and the 5 tens are carried underneath the tens column. 2 tens x 7=140, add 5 more tens makes 190	
	36 x 24= There are 24 packets of exercise books. In each packet there are 36 books. How many books altogether? 3 6 X 2 4 $1^{2}4$ 4 $^{1}7$ 2 0 8 6 4	All the previous work builds up to using the more compact standard written method for long multiplication. Children multiply the 36 by 4, carrying where necessary. Then they place a zero in the units column as they are multiplying the 36 by 20. Finally they add the two separate lines	

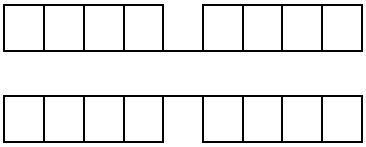
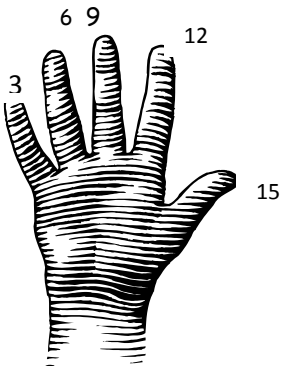
		together.	
Stage 5	Introduce **long multiplication for multiplying**  **Moving towards more complex numbers:**  	Children will move on to multiplying 4 digits by 1 or 2 digits using short and long multiplication. They will progress to multiplying decimals with up to 2 decimal places using a single digit.	
	 		

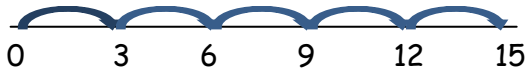
	Multiplication Key Vocabulary
Year 1	**Key vocabulary**: groups of, lots of, times, array, altogether, multiply, count **Key skills for multiplication at Y1:** Count in multiples of 2, 5 and 10. Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. Make connections between arrays, number patterns, and counting in twos, fives and tens. Begin to understand doubling using concrete objects and pictorial representations.
Year 2	**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times... **Key skills for multiplication at Y2:** • Count in steps of 2, 3 and 5 from zero, and in 10s from any number. • Recall and use multiplication facts from the **2, 5 and 10** multiplication tables, including recognising odds and evens. • Write and calculate number statements **using the x and = signs**. • Show that multiplication can be done in any order (commutative). • Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts. • Pupils use a variety of language to discuss and describe multiplication.
Year 3	**Key vocabulary**: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., **partition, grid method, multiple, product, tens, units, value** **Key skills for multiplication:** • Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10. • Write and calculate number statements using the multiplication tables they know, including **2-digit x single-digit**, drawing upon mental methods, and progressing to reliable written methods. • Solve multiplication problems, including missing number problems. • Develop mental strategies using commutativity (e.g. 4 x 12 x 5 = 4 x 5 x 12 = 20 x 12 = 240) • Solve simple problems in contexts, deciding which operations and methods to use. • Develop efficient mental methods to solve a range of problems e.g. using commutativity (**4 × 12 × 5** = 4 × 5 × 12 = **20 × 12** = 240) and for missing number problems x 5 = 20, 3 x = 18, x = 32
Year 4	**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, **inverse** **Key skills for multiplication at Y4:** • Count in multiples of 6, 7, 9, 25 and 1000 • Recall multiplication facts for **all multiplication tables up to 12 x 12.** • Recognise place value of digits in up to 4-digit numbers • Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers. • Use commutativity and other strategies mentally 3 x 6 = 6 x 3 , 2 x 6 x 5 = 10 x 6 , 39x7 = 30 x 7 + 9 x 7.

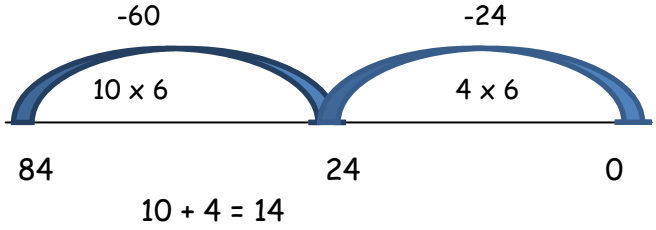
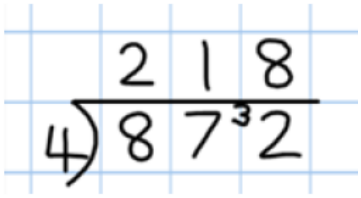
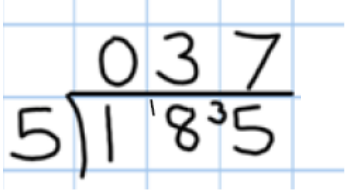
	• Solve problems with increasingly complex multiplication in a range of contexts. • Count in multiples of 6, 7, 9, 25 and 1000 • Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
Year 5	**Key vocabulary** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, **square, factor, integer, decimal, short/long multiplication, 'carry'** **Key skills for multiplication at Y5:** Identify multiples and factors, using knowledge of **multiplication tables to 12x12.** Solve problems where larger numbers are decomposed into their factors Multiply and divide integers and decimals by 10, 100 and 1000 Recognise and use square and cube numbers and their notation Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.
Year 6	**Key vocabulary**: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times... partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short / long multiplication, 'carry', **tenths, hundredths, decimal** **Key skills for multiplication at Y6:** • Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5).** • Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication. • Perform mental calculations with mixed operations and large numbers. • Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods. • Estimate answers using round and approximation and determine levels of accuracy. • Round any integer to a required degree of accuracy.

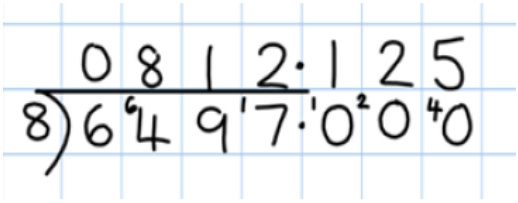
Division

Children are taught to understand division as sharing and grouping. Multiplication and sharing are interlinked. Calculations are put into practical contexts so that the child sees the relevance of the method they are learning.

<table>
<tr>
<td rowspan="2">Stage 1</td>
<td>6 ÷ 2=
Six sweets were shared between two children. How many sweets does each child get?
 
Sharing between two
There are six sweets. How many children can have two each?
 
Grouping
in 2s</td>
<td>Drawing pictures make it easy for the child to visualise the problem and often makes it easier to solve. Practical equipment is also used to model and solve the problem.</td>
</tr>
<tr>
<td>12 ÷ 4 =
12 apples are shared equally between 4 baskets. How many are in each basket?
Sharing between 4
 
Grouping in 4s
  </td>
<td>Dots or tally marks can be either shared out one at a time or split up into groups. This then clearly shows how many groups or how many in each group.</td>
</tr>
<tr>
<td>Stage 2</td>
<td>15 ÷ 3 =
How many 3s in 15?
 
</td>
<td>To work out how many threes there are children can use their fingers to count up in groups of 3.</td>
</tr>
</table>

		They can also draw these as jumps along a number line. This shows you need 5 jumps.

Stage 3	**87 ÷ 5 =** **87 ÷ 5 = (50 + 37) ÷ 5** **= (50 ÷ 5) + (37 ÷ 5)** **= 10 + 7 remainder 2** **= 17 r 2** **Initially use numbers without remainders.** **For example 65 ÷ 5**	**Partition the number being divided according to the divisor. Use brackets to separate each part of the calculation.**
	84 ÷ 6 = Each ladybird has six legs. How many ladybirds are there if there are 84 legs?  10 + 4 = 14 No remainder in the final answer.	It would take a long time to jump in sixes to 84, so children can jump on in bigger 'chunks'. A jump of ten lots takes you to 60. Then you need another 4 lots of six to reach 84. Altogether that is 14 sixes. You can also subtract chunks on the number line until you reach zero. Then you count up how many chunks you have used to reach zero.
Stage 4	Short division is taught **before** long division.  	Short division will be taught oncechildren have secured the skill of calculating 'remainders'.

	187 ÷ 7= 184 chairs are needed for a concert. They are arranged in rows of 7. How many rows of chairs are needed? 26 r 2 7 | 184 -140 (20 lots of 7) 44 - 42 (6 lots of 7) 2 No remainders initially.	This method is known as chunking. In this example, you are taking away chunks of seven. First subtract 140 (20 lots of 7) and you are left with 44. Then subtract 42 (6 lots of 7) to leave 2. Altogether that is 26 sevens with a remainder of 2. So 26 rows are needed with either a small row of two or two of the rows will need 8 chairs.
Stage 5	**347÷24=** 24 apples can fit into a box. How many boxes are needed for 347 apples? 14 r11 24 | 347 − 240 (10 lots of 24) 107 − 96 (4 lots of 24) 11	The chunking method works equally well when dividing by a two digit number. This time you are taking away chunks of 24. First subtract 240 (10 lots of 24) and you are left with 107. Then subtract 96 (4 lots of 24) and you are left with 11. The answer then is 14 boxes and 11 apples left over. the answer to the problem would be 15 boxes for 347 apples (14 full and 1 with only 11 in).
	Children progress to calculating a decimal remainder.  	**Calculating a decimal remainder:** In this example, rather than expressing the remainder as **r 1**, a decimal point is added after the units because there is still a remainder, and the one remainder is carried onto zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved.

	Division Key Vocabulary
Year 1	**Key Vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array** **Key number skills needed for division at Y1:** • Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacher • Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities. • They make connections between arrays, number patterns, and counting in twos, fives and tens.
Year 2	**Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over** **Key number skills needed for division at Y2:** • Count in steps of 2, 3, and 5 from 0 • Recall and use multiplication and division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers. • Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs. • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
Year 3	**Key Vocabulary:** share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, **inverse, short division, 'carry', remainder, multiple** **Key number skills needed for division at Y3:** • Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s). • Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to for-mal written methods. • Solve problems, in contexts, and including missing number problems, involving multiplication and division. • Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3). • Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.
Year 4	**Key Vocabulary: share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor** **Key number skills needed for division at Y4:** • **Recall multiplication and division facts for all numbers up to 12 x 12.** • Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1. • Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number • Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example 200 × 3 = 600 so 600 ÷ 3 = 200 • Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes

	shared equally between 10 children.
Year 5	**Key Vocabulary:** share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry", remainder, multiple, divisible by, factor, inverse, **quotient, prime number, prime factors, composite number (non-prime)** **Key number skills needed for division at Y5:** • Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4). • Multiply and divide numbers mentally, drawing upon known facts. • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number. • Solve problems involving multiplication and division where larger numbers are decomposed into their factors. • Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. • Work out whether a number up to 100 is prime, and recall prime numbers to 19. • Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context • Use multiplication and division as inverses. • Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g. 98 ÷ 4 = 24 r 2 = 24 2/4 = 24.5 ≈ 25). • Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.
Year 6	**Key Vocabulary: As previously, & common factor** **Key number skills needed for division at Y6:** • Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations • Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate. • Perform mental calculations, including with mixed operations and large numbers. • Identify common factors, common multiples and prime numbers. • Solve problems involving all 4 operations. • Use estimation to check answers to calculations and determine accuracy, in the context of a problem. • Use written division methods in cases where the answer has up to two decimal places. • Solve problems which require answers to be rounded to specified degrees of accuracy.