

Policy for Mathematics Calculations

West End Primary School
Updated policy completed: Nov 2014 Revised: May 2022
Agreed by staff and governors May 2022
Person responsible: A. Kelsey
Date of next review: May 2025

INTENT

The calculation policy of West End Primary School is aimed at enabling teachers to equip children with the skills and knowledge necessary to become efficient and confident mathematicians.
Children are introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods; use methods that apply to special cases; and learn to interpret and use the signs and symbols involved. Over time, children learn how to use models and images, such as empty number lines, to support their mental and informal written methods of calculation. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental and written methods that they understand and can use correctly. When faced with a calculation, children can decide which method is most appropriate and have strategies to check its accuracy.

The overall aim is that when children leave primary school they:
Have a secure knowledge of number facts and a good understanding of the four operations;

Can use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and strategies to special cases involving bigger numbers;

Make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;

Have an efficient, reliable, written method of calculation for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally.

Mental methods of calculation

Oral and mental work in mathematics is essential, particularly so in calculation. Early practical, oral and mental work must lay the foundations by providing children with a good understanding of how the four operations build on efficient counting strategies and a secure knowledge of place value and number facts. Later work must ensure that children recognise how the operations relate to one another and how the rules and laws of arithmetic are to be used and applied. Ongoing oral and mental work provides practice and consolidation of these ideas.

The ability to calculate mentally forms the basis of all methods of calculation and must be maintained and refined. A good knowledge of numbers or a 'feel' for numbers is the product of structured practice and repetition. It requires an understanding of number patterns and relationships developed through directed enquiry, use of models and images and the application of acquired number knowledge and skills.

Children should be encouraged to see maths as both a written and spoken language. Throughout school, teachers' aims are to guide the children through the following important stages:

Developing the use of pictures and a mixture of words and symbols to represent numerical activities.

Using standard symbols and conventions.

Use of jottings to aid mental strategy.

Use of pencil and paper procedure leading to formal written methods.

It is important that children do not abandon jottings and mental methods once other pencil and paper procedures are introduced. Therefore, children are encouraged to look at a calculation/problem and then decide which the best method to choose is. The long term aim for children is to be able to select an efficient method that is appropriate for the task. To do this, they need to ask themselves: Can I do this in my head?

Can I do this in my head using drawings or jottings?
Do I need a pencil and paper procedure?

Secure mental calculation requires the ability to:
Recall key number facts instantly – for example, all addition and subtraction facts for each number to at least 10; sums and differences of multiples of 10; and multiplication and division facts up to 12 × 12 by year 4.
Use taught strategies to work out the calculation – for example, recognise that addition can be done in any order. Children should be able to use this to add mentally a one-digit number or a multiple of 10 to a one-digit or two-digit number; partition two-digit numbers in different ways including into multiples of ten and one and add the tens and ones separately and then recombine.
Understand how the rules and laws of arithmetic are used and applied – for example, to add or subtract mentally combinations of one-digit and two-digit numbers; and to calculate mentally with whole numbers and decimals.

Introducing Written Methods of Calculation
Children should only be introduced to formal written methods once they are secure with understanding of the number system. To prepare the children for written methods in all four operations, much visual and kinaesthetic work is carried out in the Foundation Stage and KS1 to make children *'number happy'*. Teachers use models, images and diagrams, alongside physical, moveable objects and Numicon to immerse children in the language of numbers, counting and mathematical relationships. Ongoing practical activities and continual teacher modelling with concrete, pictorial and abstract manipulatives ensures that children can move onto the next stage of written methods with understanding.

Early Years Foundation Stage

In Nursery, children develop a love of maths through games, songs, rhymes, and play using concrete manipulatives. Along with focused teaching activities children are supported in their play to develop the knowledge skills and language needed for all areas of maths.

In Reception, we are led by NCETM Mastery approach and supplement this with White Rose Maths resources. High quality learning environments and meaningful interactions with adults, support children in developing mathematical thinking and discussion. Pupils learn through games and tasks using concrete manipulatives and pictorial structures and representations which are then rehearsed applied and recorded within their own child-led exploration. Children in Reception have daily maths input to develop fluency, revisit key concepts and address misconceptions.

Early Learning Goals for Early Years Foundation Stage:

Number

- Have a deep understanding of number to 10, including the composition of each number.
- Subitise (recognise quantities without counting) up to 5.
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Numerical Patterns

- Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be dis tributed equally.

Within Early Years practical calculation opportunities are investigated through subitising, composition and comparison.

Mastering Number: Overview of content – Reception

Strand/ Half-term	Subitising	Cardinality, ordinality and counting	Composition	Comparison
1 **Children will:**	• perceptually subitise within 3 • identify sub-groups in larger arrangements • create their own patterns for numbers within 4 • practise using their fingers to represent quantities which they can subitise • experience subitising in a range of contexts, including temporal patterns made by sounds.	• relate the counting sequence to cardinality, seeing that the last number spoken gives the number in the entire set • have a wide range of opportunities to develop their knowledge of the counting sequence, including through rhyme and song • have a wide range of opportunities to develop 1:1 correspondence, including by coordinating movement and counting • have opportunities to develop an understanding that anything can be counted, including actions and sounds • explore a range of strategies which support accurate counting.	• see that all numbers can be made of 1s • compose their own collections within 4.	• understand that sets can be compared according to a range of attributes, including by their numerosity • use the language of comparison, including 'more than' and 'fewer than' • compare sets 'just by looking'.
2 **Children will:**	• continue from first half-term • subitise within 5, perceptually and conceptually, depending on the arrangements.	• continue to develop their counting skills • explore the cardinality of 5, linking this to dice patterns and 5 fingers on 1 hand • begin to count beyond 5 • begin to recognise numerals, relating these to quantities they can subitise and count.	• explore the concept of 'wholes' and 'parts' by looking at a range of objects that are composed of parts, some of which can be taken apart and some of which cannot • explore the composition of numbers within 5.	• compare sets using a variety of strategies, including 'just by looking', by subitising and by matching • compare sets by matching, seeing that when every object in a set can be matched to

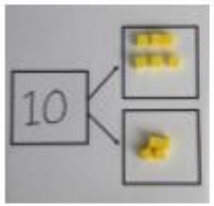
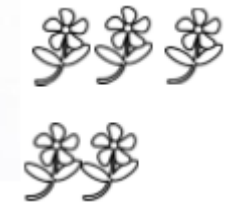
				one in the other set, they contain the same number and are equal amounts.
3 **Children will:**	• increase confidence in subitising by continuing to explore patterns within 5, including structured and random arrangements • explore a range of patterns made by some numbers greater than 5, including structured patterns in which 5 is a clear part • experience patterns which show a small group and '1 more' • continue to match arrangements to finger patterns.	• continue to develop verbal counting to 20 and beyond • continue to develop object counting skills, using a range of strategies to develop accuracy • continue to link counting to cardinality, including using their fingers to represent quantities between 5 and 10 • order numbers, linking cardinal and ordinal representations of number.	• continue to explore the composition of 5 and practise recalling 'missing' or 'hidden' parts for 5 • explore the composition of 6, linking this to familiar patterns, including symmetrical patterns • begin to see that numbers within 10 can be composed of '5 and a bit'.	• continue to compare sets using the language of comparison, and play games which involve comparing sets • continue to compare sets by matching, identifying when sets are equal • explore ways of making unequal sets equal.
4 **Children will:**	• explore symmetrical patterns, in which each side is a familiar pattern, linking this to 'doubles'.	• continue to consolidate their understanding of cardinality, working with larger numbers within 10 • become more familiar with the counting pattern beyond 20.	• explore the composition of odd and even numbers, looking at the 'shape' of these numbers • begin to link even numbers to doubles • begin to explore the composition of numbers within 10.	• compare numbers, reasoning about which is more, using both an understanding of the 'how manyness' of a number, and its position in the number system.
5 **Children will:**	• continue to practise increasingly familiar subitising arrangements, including those which expose '1 more' or 'doubles' patterns • use subitising skills to enable them to identify when patterns show the same number but in a different arrangement, or when patterns are similar but have a different number • subitise structured and unstructured patterns, including those	• continue to develop verbal counting to 20 and beyond, including counting from different starting numbers • continue to develop confidence and accuracy in both verbal and object counting.	• explore the composition of 10.	• order sets of objects, linking this to their understanding of the ordinal number system.

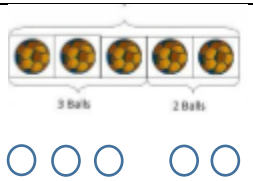
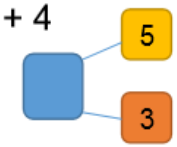
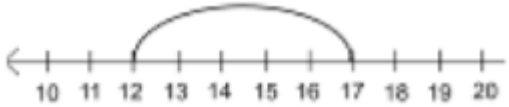
	which show numbers within 10, in relation to 5 and 10 • be encouraged to identify when it is appropriate to count and when groups can be subitised.			
6	In this half-term, the children will consolidate their understanding of concepts previously taught through working in a variety of contexts and with different numbers.			

IMPLEMENTATION

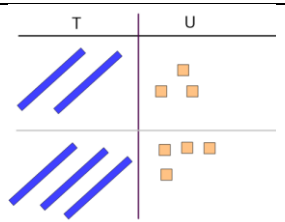
How to calculate formal methods in KS1 and KS2

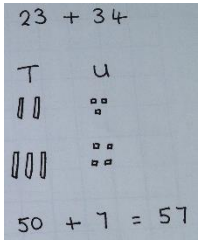
Addition

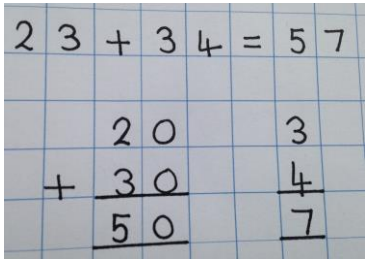
Stage and Method	Example	Notes
Stage One *Children in Year 1 would normally be expected to start working at this stage.* Counting sets of objects by combining them.	   Use cubes to add two numbers together as a group or in a bar. 	Children in Year 1 may need to begin by finding totals for smaller numbers first. Vocabulary: add, more, and, make, sum, total, altogether one more, two more, ten more…how many more to make… ? is the same as, equals, total addition
Stage Two *Children in Year 1 would normally be expected to start working at this stage.* Combining two parts to make a whole: part-whole model		As children develop concrete strategies in Stage One, they will begin to use pictorial representations. Children may use existing pictures and will begin to draw their own pictures or circles to represent objects.

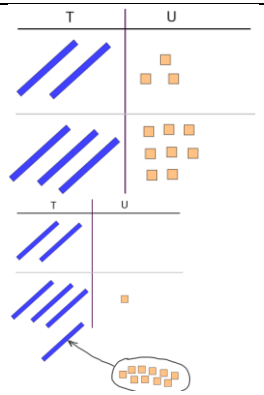
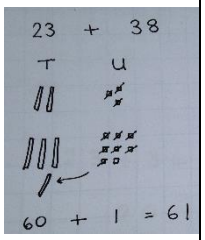
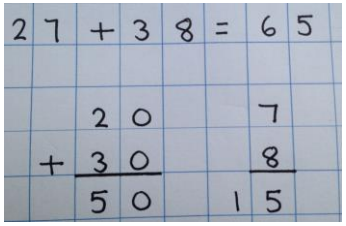
Use pictures or circles and count how many altogether		As children move into abstract representations, they will begin to use signs + and = They will also use numbers in whole: part-whole models. 4 + 3 = 7 10= 6 + 4  Children should become increasingly secure with finding number bonds to different totals (up to 20 by the end of Year 1).
Stage Three *Children in Year 1 would normally be expected to begin working at this stage.* Starting at the bigger number and counting on	12 + 5 a) Concrete: Start with the larger number on the bead string and then count on the smaller number 1 by 1 to find the answer.  b) Pictorial: Start at the larger number on the number line and count on in ones or in one jump to find the answer.  c) Abstract: Place the larger number in your head and count on the smaller number to find your answer. Children get 5 'ready' on their fingers, tap their head and say 12, and then count on for the number of fingers	

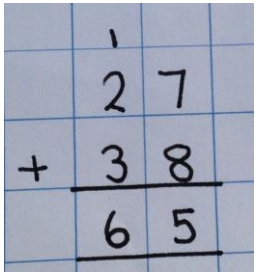
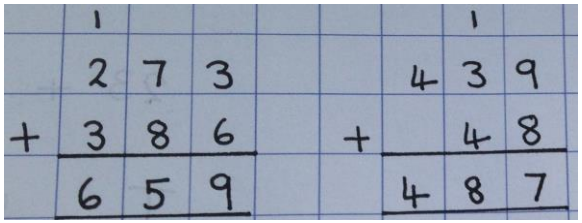
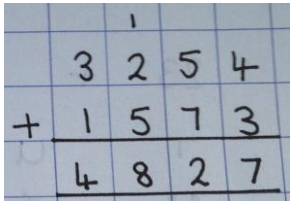
	they are holding up, tapping their nose to keep a track of which finger they are on.	
Stage Four *Children in Year 1 would normally be expected to begin working at this stage.* a) Add a single digit to 10 using their knowledge of place value b) Add a single digit or a multiple of 10 to a multiple of 10 using their knowledge of place value	"10 + 7 = 17 because 17 is the same as 1 ten and 7 ones." "30 + 9 = 39 because 39 is the same as 30(3 tens) and 9 ones."	Base Ten apparatus is used to support children's understanding.
Stage Five *Children in Year 2 would normally be expected to be working at this stage.* Add a 2-digit number to a 2-digit number using Base Ten equipment - no regrouping	23 + 34 Concrete: Children get two ten sticks and three one cubes, then three ten sticks and four one cubes. They count the one cubes first and record the number of ones, then the ten sticks and record the number of tens.	Children should start becoming used to lining up the equipment in tens and ones columns ready for the transition to column addition

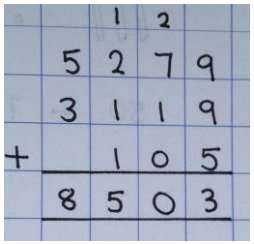
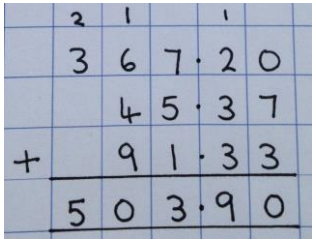

T
U


23 + 34
T U
50 + 7 = 57

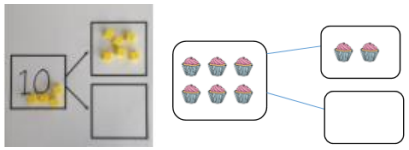
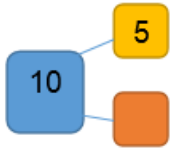
	Pictorial: 23 + 34. Children draw representations of ten sticks and ones, instead of using actual equipment	
Stage Six *Children in Year 2 would normally be expected to be working at this stage.* Add a 2-digit number to a 2-digit number using partitioning first - no regrouping		
Stage Seven *Children in Year 2 would normally be expected to be working at this stage.* Add a 2-digit number to a 2-digit number using Base Ten equipment - regrouping	23 + 38 Concrete: Children get two ten sticks and three one cubes, then 3 ten sticks and 8 one cubes. They count the one cubes first, and swap ten of them for one ten stick. They then record the remaining ones, then count the ten sticks and record the number of tens.	Children will also practise adding two 2-digit numbers on an empty number line to ensure children have a 'feel' for the size of the numbers and number order.

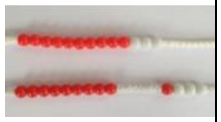
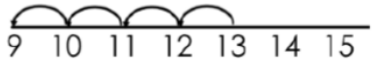
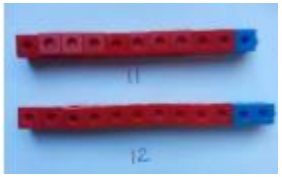
	  Pictorial: Children draw representations of ten sticks and ones, instead of using actual equipment. When they swap the ones for a ten they will cross out the ten separate ones first.	
Stage Eight *Children in Year 3 would normally be expected to be working at this stage.* Children partition 2-digit numbers before adding them together - regrouping		Where the one addition bridges ten, children add the tens number to the teens number mentally. Vocabulary: add, more, and, addition, plus, increase make, sum, total, altogether how many more to make… ? is the same as, equals, total partition inverse

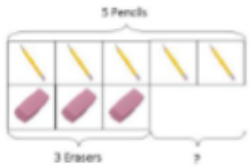
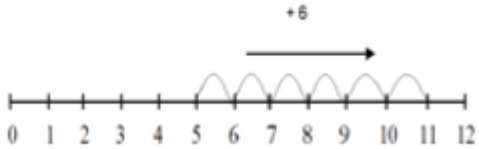
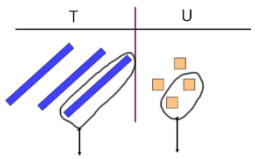
Stage Nine *Children in Year 3 would normally be expected to be working at this stage.* Children add two 2-digit numbers using column addition.		When children carry the digit above, it is important that this is placed directly in line with the appropriate column (in this case, the tens column). Vocabulary: add, more, and, addition, plus, increase make, sum, total, altogether how many? is the same as, equals, total carry, carrying
Stage Ten *Children in Year 3 would normally be expected to be working at this stage.* Children secure in column addition involving carrying move on to: - adding two 3-digit numbers - adding a 3-digit number to a 2-digit number		Estimation must continue to be used to ensure that children can check whether their answer seems sensible. Place-value should continually be referred to so children understand the quantities involved. Base 10 apparatus can be used to support this understanding.
Stage Eleven part 1 *Children in Year 4 would normally be expected to be working at this stage.* Children secure in column addition in Stage Ten move on to: - adding numbers with up to 4-digits		

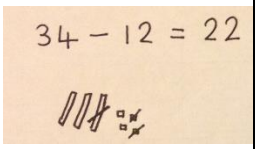
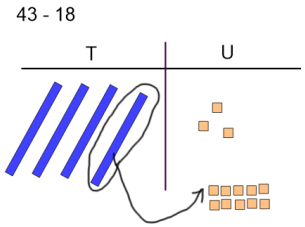
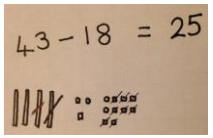
Stage Eleven part 2 *Children in Year 5 would normally be expected to be working at this stage.* Children secure in column addition involving carrying move on to: - adding more than two numbers together		Vocabulary: add, more, and, addition, plus, increase, sum, total, altogether, how many? is the same as, equals, total, makes inverse carry, carrying When additions involve negative numbers or time, children may use or draw their own number lines to support this.
Stage Twelve *Children in Year Six would normally be expected to be working at this stage.* Children secure in column addition involving carrying move on to applying this method to: - numbers with any number of digits - adding more than two numbers together - numbers with decimal places		When addition involves numbers with different numbers of decimal places, children are taught to line up the decimal points carefully. To help with this, children may add 0 to an empty column (e.g. writing 367.20 instead of 367.2).

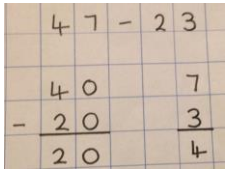
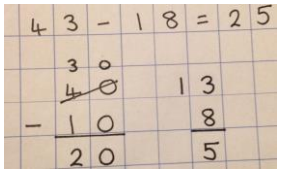
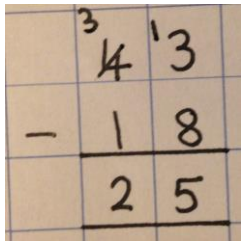
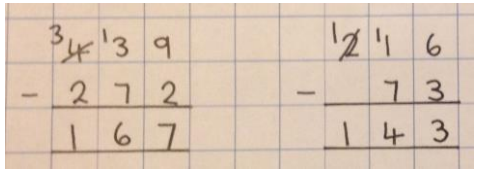
Subtraction

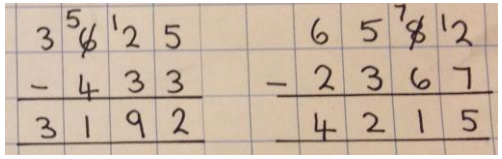
Stage and Method	Example	Notes
Stage One *Children at the beginning of Year 1 would normally be expected to be working at this stage.* Find how many are left practically.	Children have a group of 7 objects and remove 3 from that group, counting that there are 4 left.	Subtraction using objects (concrete) should continue throughout Reception and Year 1.
Stage Two *Children in Year 1 would normally be expected to be working at this stage.* Draw pictures or circles and cross out the amount to be taken away. Count how many are left.	7 – 3 = 4 	As children develop concrete strategies in Stage One, they will begin to use pictorial representations. Children may use existing pictures and will begin to draw their own pictures or circles to represent objects. Children will use objects or numbers in whole: part-whole models. This will help them see the link between addition and subtraction   As children move into abstract representations, they will begin to use signs - and = .

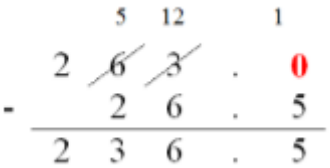
Stage Three *Children in Year 1 would normally be expected to be working at this stage.* Counting back from the larger number	13 – 4 Concrete: Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones.  Use counters and move them away from the group as you take them away counting backwards as you go.  Pictorial: Start at the bigger number and count back the smaller number showing the jumps on the number line.  Abstract: Put 13 in your head. Count back 4. What number are you at? Use your fingers to help.	Vocabulary: how many more is… than…? take (away), leave how many more is… than…? how many are left/left over? how many have gone? one less, two less… ten less… how many fewer is… than…? smaller
Stage Four *Children in Year 1 would normally be expected to be working at this stage. These methods should continue to be practised in Year 2.* Count on to find the difference	Compare amounts and objects to find the difference. Use cubes to build towers or make bars to find the difference. 	Children begin associating both take away and finding the difference as forms of subtraction. Children count on to find the difference in line with their ability to count on in addition- they may use a number line to do this, or they may count on from the smaller number up to the bigger number using their fingers.

	Use basic bar models with items to find the difference  Count on to find the difference. 	Vocabulary: how many more is… than…? take (away), leave, subtract, minus how many more is… than…? how many are left/left over? how many have gone? one less, two less… ten less… how many fewer is… than…? how much more is …? how much less is …? difference between
Stage Five *Children in Year 1 would normally be expected to be working at this stage.* a) Subtract a single digit from a teens number using their knowledge of place value b) Subtract a single digit from a tens number using their knowledge of place value	"17 - 7 = 10 because 17 is the same as 1 ten and 7 ones." "23 - 3 = 20 because 23 is the same as 2 tens and 3 ones"	Base Ten apparatus is used to support children's understanding.
Stage Six *Children in Year 2 would normally be expected to working at this stage.* Subtract a 2-digit number from a 2-digit number using Base Ten equipment - no regrouping	Use Base 10 to make the bigger number then take the smaller number away. 34 – 12 = 22 Concrete: children get three ten sticks and four one cubes. They physically take away two one cubes and one ten stick, 	

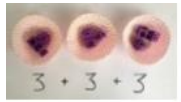
	then count how many tens and ones are left. Pictorial: Children draw representations of ten sticks and ones, instead of using actual equipment. They then cross out the tens and ones to be taken away. 	
Stage Seven *Children in Year 2 would normally be expected to working at this stage.* Subtract a 2-digit number from a 2-digit number using Base Ten equipment - regrouping	43 – 18 Concrete: Children get four ten sticks and three one cubes. They know they can't take eight one cubes away when they only have 3, so they swap one of their ten sticks for ten one cubes.  They then take eight of them away and record the number of ones left over. They then take away one ten stick from the remaining 3 and record the number of tens left over. Pictorial:  Pictorial: Children draw representations of ten sticks and ones, instead of using actual equipment. When they exchange the ten for ones they will cross out the ten stick and	Vocabulary: how many more is… than…? take (away), leave, subtract, minus how many more is… than…? how many are left/left over? how many have gone? one less, two less, ten less, one hundred less how many fewer is… than…? how much more is …? how much less is …? difference between partition, swap

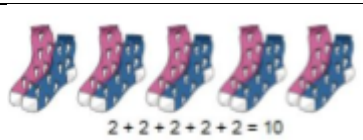
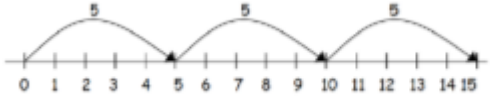
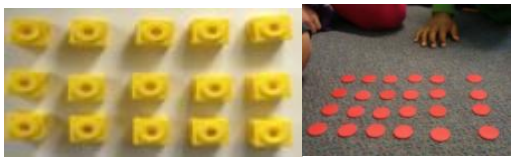
	draw the ones in. They will then cross out the tens and ones to be taken away.	
Stage Eight *Children in Year 3 would normally be expected to working at this stage.* Subtract a 2-digit number from a 2-digit number using partitioning a) No regrouping b) regrouping	a)  b)  	Children solve problems involving subtracting a bigger ones digit from a smaller one by 'borrowing' a ten. They learn that numbers can be partitioned into more than just tens and ones (e.g. 43 can be 40 and 3 but also 30 and 13). Vocabulary: take (away), leave, subtract, minus difference between partition, swap, borrow
Stage Nine *Children in Year 3 would normally be expected to be working at this stage.* Subtract two 2-digit numbers using column subtraction	 	Vocabulary: take (away), leave, subtract, minus, subtraction, decrease difference between borrow, borrowing leave, how many are left/left over? difference (between) how much more/less is…? tens, ones, etc. inverse
Stage Ten *Children in Year 3 would normally be expected to be working at this stage.* Children secure in column subtraction involving carrying move on to: - subtracting two 3-digit numbers - subtracting a 2-digit number from a 3-digit number	 	It is essential that estimation continues to be used to help children understand quantities involved. They must learn to check that the answer they have found is sensible.

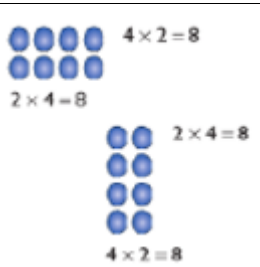
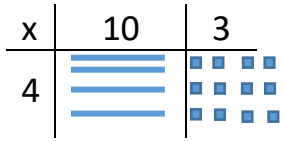
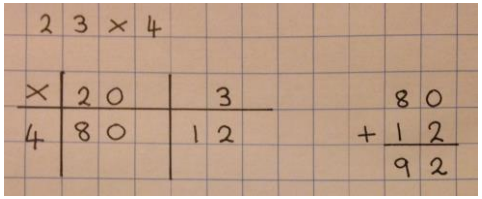
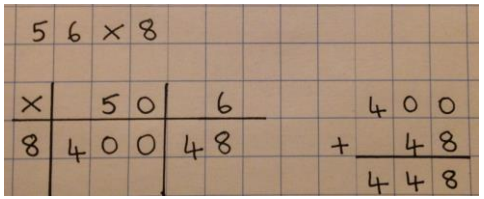
Stage Eleven *Children in Year 4 would normally be expected to be working at this stage.* - subtracting numbers with up to 4-digit		
Stage Twelve *Children in Year 5 would normally be expected to be working at this stage.* Children secure in column subtraction involving borrowing move on to: - numbers which involve borrowing from 0	1 9 5 2 0 ¹7 - 3 1 1 9 2 0 8 8	Children know when they need to borrow from 0, they move left along the place value columns to the next digit. They then know to borrow from this total number of tens (in this example, they know that there are 20 tens, and if they borrow 1 ten to change 7 into 17, they will have 19 tens left over). Vocabulary: take (away), leave, subtract, minus, subtraction, decrease difference between borrow, borrowing leave, how many are left/left over? difference (between) how much more/less is…? tens, ones, etc. inverse
Stage Thirteen *Children in Year Six would normally be expected to be working at this stage.*	4 9 9 5 0 0 ¹4 - 2 6 3 8 2 3 6 6	Children know when they need to borrow from 0, they need to keep moving left along the place value columns until they get to a digit that is worth more than 0. They then know to borrow from this total number of tens (in this

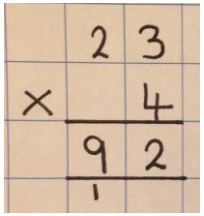
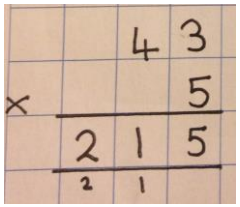
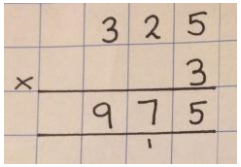
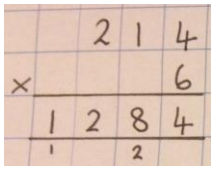
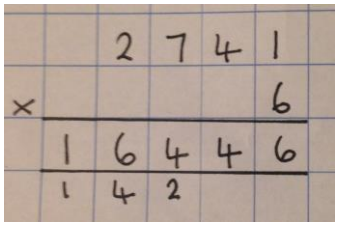
Children secure in column subtraction involving borrowing move on to applying this method to: - numbers with any number of digits - numbers with decimal places - numbers which involve borrowing from two or more 0s		example, they know that there are 500 tens, and if they borrow 1 ten to change 4 into 14, they will have 499 tens left over). Children know that when the numbers involved in a subtraction are close together or both near to multiples of 10/100 etc. then counting on to find the difference (drawing a number line to support as necessary) is more efficient.

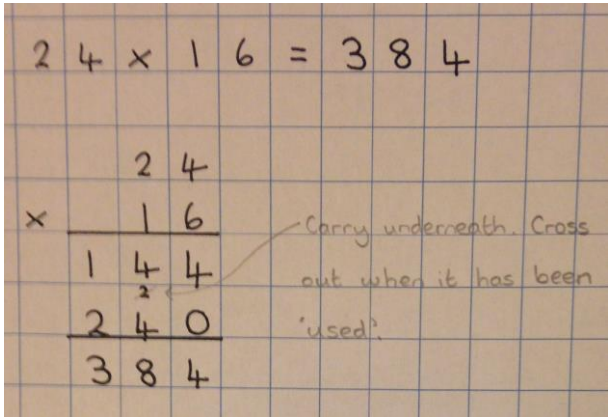
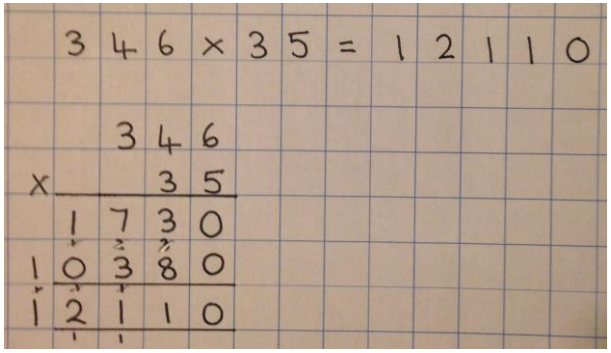
Multiplication

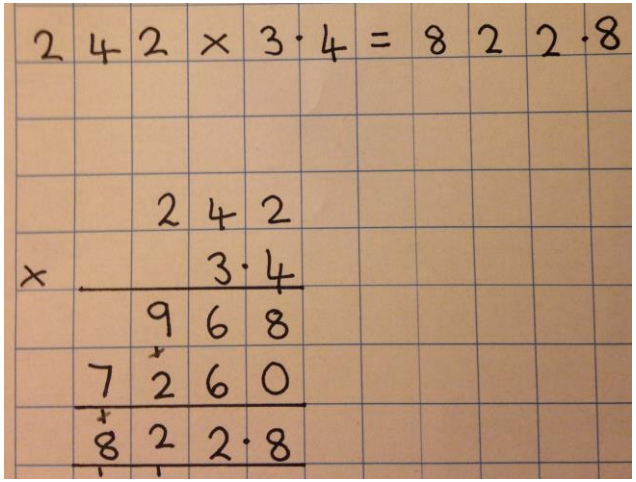
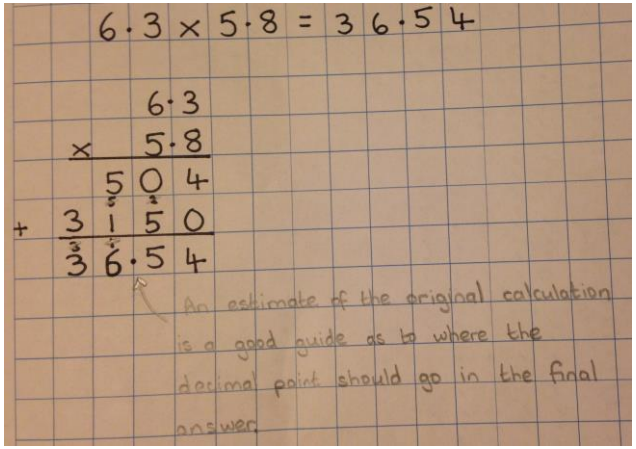
Stage and Method	Example	Notes
Stage One *Children in Year 1 would normally be expected to be working at this stage.* Counting in multiples	Children move two cubes together and at the same time, saying "two" and then move another two counters together and at the same time, saying "four" etc. a) Concrete: supported by objects in equal groups   b) Pictorial: representing repeated groups as pictures and counting "2, 4, 6 so 3 groups of 2 is 6" 	Children would first need to be very familiar in counting up in twos/fives/tens before they attempt to count objects in this way. Vocabulary: count in ones, twos, fives, tens double
Stage Two *Children in Year 1 would normally be expected to be working at this stage.* Understanding repeated addition using groups of objects or groups on a numberline.	   Use different objects to add equal groups.	Children count groups of 2, 5 or 10. Using their knowledge of addition they can add equal groups of other multiples. Children begin to write addition number sentences to describe pictures and objects. Vocabulary:

	  5 + 5 + 5 = 15	count in ones, twos, fives, tens groups of/ lots of/ sets of double
Stage Three *Children in Year 2 would normally be expected to be working at this stage.* Representing multiplications as arrays	a) Concrete: using counters/cubes to represent multiplication number sentences 5 x 3 = 15  b) Pictorial: using given pictures and drawing own arrays 5 x 3 =15  c) Draw arrays in different rotations to find commutative multiplication sentences	Children are introduced to the multiplication symbol. Arrays are used to reinforce repeated addition and to write multiplication number sentences. 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15 Vocabulary: count in twos, threes, etc. … times tables groups of/ lots of/ sets of times, multiply, multiplied by, multiplication multiple of times as (big, long, wide, etc.) array double

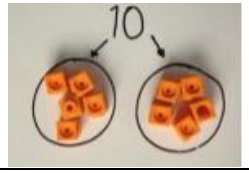
		Children are also encouraged to solve multiplication calculations by using known times table facts and adding on (for example, knowing 5 x 3 = 15 so 6 x 3 = 18)
Stage Four *Children in Year 3 would normally be expected to be working at this stage.* Representing TU x U multiplication practically and pictorially using Base Ten equipment	4 x 13  40 + 12 = 52	
Stage Five *Children in Year 3 would normally be expected to be working at this stage.* Multiply a 1-digit number by a 2-digit number using grid multiplication	 	Children are taught that to multiply a tens number, you treat the tens digit as though it was a ones digit (so x50 becomes x5) and then readjust the place value of the answer (in the second example, 5 x 8 =40 so 50 x 8 = 400)

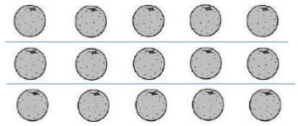
Stage Six *Children in Year 3 would normally be expected to be working at this stage.* Children secure at Stage 5 then move on to formal column multiplication for TU x U	  	Children are taught to multiply the one digit by the 1-digit number first and to carry any tens <u>underneath</u> the tens column, ready to add when the tens digit is multiplied to the 1-digit number. NB: the carried ten is put <u>underneath</u> in preparation for long multiplication at a later stage.
Stage Seven *Children in Year 4 would normally be expected to be working at this stage.* Children multiply two-digit and three-digit numbers by a one-digit number using formal written layout.	  	Children are taught to make estimates of their calculations to maintain an understanding of place-value and to help prevent careless mistakes.
Stage Eight *Children in Year 5 would normally be expected to be working at this stage.* Children secure in column multiplication for TU x U and HTU x U move on to applying this method to: - ThHTU x U	 	

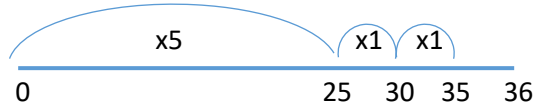
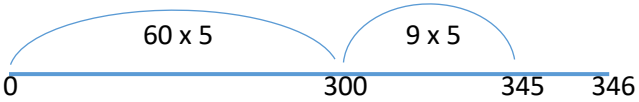
Stage Nine *Children in Year 5 would normally be expected to be working at this stage.* Children multiply numbers up to 4 digits by a two-digit number using long multiplication	 	Children set out long multiplication with the larger number on top. They multiply each digit in the larger number in turn by the ones digit in the smaller number first, forming the first number below the first 'equals' line. Carried numbers are placed underneath the line being worked on. They then move on to multiplying each digit in the larger number. They place a 0 in the ones column first. They then multiply each digit in the larger number by the tens digit in the smaller number, forming the second number. They then add these two numbers together to find the total.

Stage ten *Children in Year Six would normally be expected to be working at this stage.* Children secure in long multiplication can apply this method to numbers with decimal places.	 	Children begin by performing long multiplication as if there are no decimal points. For the final answer, an estimate of the original calculation is a good guide as to where the decimal point should go. In the first example, the calculation is approximately 250 multiplied by 3 (and a half). Children working at this level should understand that there is only one sensible place the decimal point could go – 822.8 (not 82.28 or 8.228) In the second example, the calculation is approximately 6 x 6. This makes it very clear where the decimal point should go. 36.54 (not 3.654 of 365.4). There is a rule of thumb about where to put the decimal point (e.g. make sure the **answer** has as many decimal places as the **two original numbers combined**.) This can be a useful guide although estimating helps children understand the quantities involved and to check for careless errors.

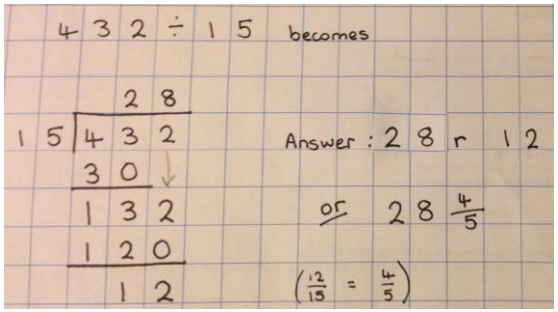
Division

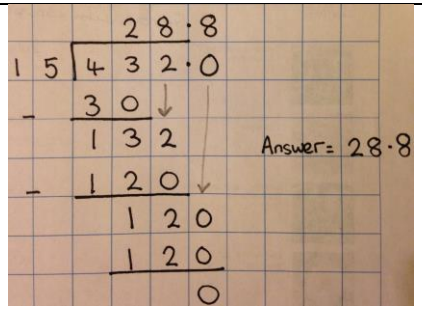
Stage and Method	Example	Notes
Stage One *Children in Year 1 would normally be expected to be working at this stage.* Share out into equal groups practically.	Children have a group of 12 grapes and share them out between three bowls, putting one in each bowl at a time. They count and know that there are 4 grapes in each bowl.  I have 10 cubes, can you share them equally in 2 groups? 10 ÷ 2 = 5	Vocabulary: fair, the same, equal half (each) less, more “one for you, one for you, one for you” / “one for you, one for me” sharing, share (out) left (over)
Stage Two *Children in Year One would normally be expected to be working at this stage.* Share out into equal groups by drawing pictures.	8 ÷ 2 	Vocabulary: fair, the same, equal half (each) less, more sharing, share (out) left (over)
Stage Three *Children at the end of Year One and in Year Two would normally be expected to be working at this stage.* Divide by grouping, using pictures or practical equipment to support.	 How many groups of 2 are in 10? 10 ÷ 2 = 5 How many groups of 3 are in 12? 	Children in Year Two will be introduced to the division symbol and would record their calculations as a division number sentence. Children working at this stage in Year Two who have begun to learn times table facts off by heart are encouraged to use these to help work out inverse division calculations. Vocabulary: fair, the same, equal half (each)

	12 ÷ 3 = 4	sharing, share (out) left (over), remainder (equal) groups of group in pairs/ threes/ tens How many groups of …. are in …. ? divide, divided by, divided into
Stage Four *Children in Year Two would normally be expected to be working at this stage.* Divide by using an array, linking division to multiplication	  15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	Vocabulary: array, inverse,
Stage Five *Children at the end of Year Two and in Year Three would normally be expected to be working at this stage.* Divide by grouping, using a number line.	35 ÷ 5 = 7  0 5 10 15 20 25 30 35	Vocabulary: How many groups of … are in …? How many groups of … go into …? Although children need to understand grouping and sharing, a greater focus is placed on grouping as a prerequisite for efficient mental methods and later written methods.
Stage Six *Children at the end of Year Two and in Year Three would normally be expected to be working at this stage.* Find a remainder by finding how many are left over.	Draw dots and group them to divide an amount and clearly show a remainder. 	Vocabulary: fair, the same, equal half (each) left (over), remainder (equal) groups of group in pairs/ threes/ tens divide, divided by, divided into, division

	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  36 ÷ 5 = 7r1  	
Stage Seven *Children at the end of Year Three would normally be expected to be working at this stage.* Divide by grouping, using a number line, in chunks of 5 or 10.	36 ÷ 5 = 7r1  	
Stage Eight *Children in Year Four would normally be expected to be working at this stage.* Grouping in chunks on a number line.	346 ÷ 5 = 69r1  	Children initially do this using a times table chart or a multiplication square to support them in doing the most effective groups possible. When working with larger numbers, they also use the times table facts along with their knowledge of place value to do, for example, 20 groups at once. Once children become more secure in both this method and their times tables facts, they move away from using these supports and do this mentally. Vocabulary:

		left (over), remainder (equal) groups of divide, divided by, divided into, division, divisible by
Stage Nine *Children in Year Four would normally be expected to be working at this stage.* Dividing using formal short division.	98 ÷ 7 becomes 1 4 7 | 9 (2) 8 Answer: 14 432 ÷ 5 becomes 8 6 r 2 5 | 4 3 (3) 2 Answer: 86 remainder 2	In introducing short division, links are made to children's previous division calculation methods by referring to 'groups of' and demonstrating pictorially how we find the groups and carry the remainder forward; in this example: "How many groups of 5 in 7? 1r2 Children initially learn to write remainders as a whole number. Vocabulary: left (over), remainder, fraction (equal) groups of divide, divided by, divided into, division, divisible by

Stage Ten *Children in Year Five would normally be expected to be working at this stage.* Formal short division involving: - writing remainders as decimals - dividing by teen numbers	773 ÷ 5= 145r3 or $145\frac{3}{5}$ $5\overline{)7\ {}^{2}7\ {}^{2}3}$ with quotient $1\ 5\ 4\ r3$ 141 ÷ 6 = 23.5 $6\overline{)1\ 4\ {}^{2}1\ .\ {}^{3}0}$ with quotient $0\ 2\ 3\ .\ 5$ 143 ÷ 13 = 11 $13\overline{)1\ 4\ {}^{1}3}$ with quotient $0\ 1\ 1$	Vocabulary: divide, division, divided by, divided into, divisible by equal groups of remainder, fraction, decimal Whether a remainder is interpreted as a whole number, a fraction or a decimal will depend on the context of the question.
Stage Eleven *Children in Year Six would normally be expected to be working at this stage.* Long division including showing working for dividing by 2-digit numbers.	 or	Children use estimation, key times tables facts, and their own jottings to support their long division calculations. They write the remainder as whole number remainders, fractions, decimals or by rounding, as appropriate for the context.

Impact

Formal assessments of key skills each term will show that the children make progress in their learning across the year and age ranges. This cumulates in SATs assessments in year 2 and 6 which further informs the impact of mathematical teaching. The children will have a secure knowledge of number facts and a good understanding of the four operations.

They can use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and strategies to special cases involving greater numbers.

They will make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads. The children will have an efficient, reliable, written method of calculation for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally.

The children can confidently use mathematically language to explain and evaluate the methods, prove their answer and address misconceptions.