St Lawrence CE Primary School

Calculation Policy

Revised: June 2020

Consultation with staff and Governors

and adoption of policy: Summer Term 2020

Review date: Summer Term 2021

Policy Approach

A key priority of this policy is to ensure that children develop a strong sense of number, calculations, place value and applying these to familiar and unfamiliar situations. This can be presented in the form of: language use; calculation work; the recognising of patterns and applications to different contexts. The policy draws influence from the 'Maths Mastery' approach, as well as 'Signposting' and 'Reasoning within Maths'.
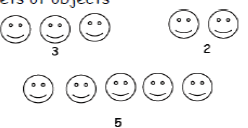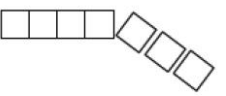
We believe in encouraging all children in school to become confident and brave mathematicians through challenge and high expectations. Content is appropriately differentiated to ensure good progress. Children are encouraged to take responsibility for their own learning and their successes are celebrated alongside their next steps being identified.

The Maths Mastery approach, which is heavily influenced by Shanghai Maths, influences lesson design to provide considerable experience with concrete equipment, before moving on to more abstract recording. Small, well planned and careful progression steps are worked through to ensure children develop strong foundation skills within all calculation areas. Stamina and resolve when problem solving and reasoning is worked on, so that the children are able to make their own choices and explain their decisions. This is also furthered through a 'why?', 'why not?' and 'what if…' model.

Both quantitative and non-quantitative models are used as representations for calculations across school. This is coupled with the use of concrete manipulatives that aid the children in visualising the mathematical concepts they are exposed through during their Primary Education.

The policy also identifies the importance of language use by children in Maths. Not only does this aid in their ability to explain, reason and problem solve, but we feel it also allows them to internalise their understanding as they compartmentalise and verbalise concepts. We strengthen this approach through our 'Talk Time/Oracy' work in school.

Foundation Stage (Reception)

Addition	Subtraction	Multiplication	Division
✓ Counts objects to 10, and beginning to count beyond 10. ✓ Selects the correct numeral to represent 1 to 10 objects. ✓ Counts an irregular arrangement of up to ten objects. ✓ Estimates how many objects they can see and checks by counting them. ✓ Uses the language of 'more' to compare two sets of objects. ✓ Finds the total number of items in two groups by counting all of them. ✓ Says the number that is one more than a given number. ✓ Begin to combine two sets of objects using concrete manipulatives.	✓ Know that the number gets smaller because objects have been removed. ✓ Uses the language of 'more' and 'fewer' to compare two sets of objects. ✓ Counts backwards on fingers, orally or on number lines. ✓ Begin to use manipulatives to show that subtraction is removing objects from a set. ✓ Finds one more or one less from a group of up to five objects, then ten objects. ✓ In practical activities and discussion, beginning to use the vocabulary involved in subtracting.	✓ Jumping along a number line in steps of 1, 2, 5 and 10. ✓ Repeated addition skills shown. ✓ Know how many groups of 2 there are when shown manipulative sets.	✓ Jumping back using a number line in 1, 2, 5 and 10. ✓ Understanding what halving is. ✓ Sharing manipulatives into equal groups.

What Expected Looks Like

Counting sets of objects 	Practical – get a group of objects and take some away. There are 5 cakes. I take 2 away. How many are left?	Counting practically in repeated groups/patterns How many feet have these three teddy bears got altogether? How many wheels do we need for these three lego cars? 4 + 4 + 4 = 12	Five teddies are having a picnic. They have taken six cakes with them. Every teddy has a cake, how many cakes are left? Can we share these cakes fairly between two children?

Greater Depth

Addition	Subtraction	Multiplication	Division
✓ Children count reliably with numbers from 1 to 20, place them in order and say which number is one more than a given number. ✓ Using quantities and objects, they add two single-digit numbers and count on to find the answer. ✓ Understanding and talking about the number getting bigger when you add. ✓ Addition is commutative.	✓ Children count reliably with numbers from 1 to 20, place them in order and say which number is one less than a given number. ✓ Using quantities and objects, they subtract two single-digit numbers and count back to find the answer. ✓ Know that the number gets smaller when you 'take away' or subtract. ✓ Verbalise subtraction sentences.	✓ They solve problems, including doubling. ✓ Count objects aloud in 2s, 5s and 10s.	✓ They solve problems, including halving and sharing. ✓ Share objects aloud in 2s, 5s and 10s.

What Greater Depth Looks Like

Year 1

Addition	Subtraction	Multiplication	Division
✓ Recall addition facts up to 5. ✓ Represent and use number bonds within 10 and 20. ✓ Identify near doubles using doubles already known. ✓ Understand the operation of addition; recognise that addition can be done in any order. ✓ Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. ✓ Add a single digit number to a 2-digit number. ✓ Bridge through 10 and 20 when adding single-digit numbers. ✓ Solve one-step problems that involve and missing number problems such as __ + 6 = 14	✓ Recall subtraction facts up to 5. Represent and use number bonds and related subtraction facts within 10 and 20. ✓ Subtract a single digit number from a 2-digit number. ✓ Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs. ✓ Solve one-step problems that involve and missing number problems such as ✓ 12 - __ = 5	✓ Recall addition doubles up to 5 + 5. ✓ Understand the x sign. ✓ Count forwards up to 100 in 2s, 5s and 10s. ✓ Solve one-step times tables problems up to 20 (manipulatives).	✓ Understand the ÷ sign. ✓ Count backwards in 2s, 5s and 10s from any number. ✓ Solve one-step division/halving problems up to 20 (manipulatives).

Examples of ARE

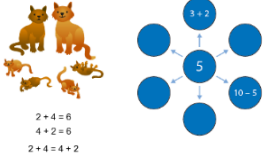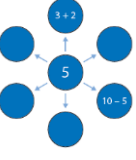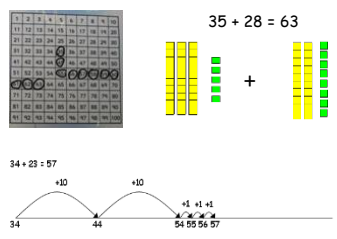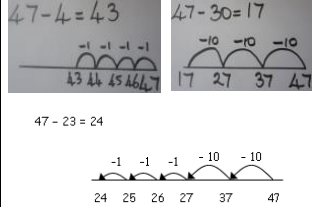|			
			If one teddy has two apples, how many apples will three teddies have? **Here are 10 lego people If 2 people fit into the train carriage, how many carriages do we need?** **How else could 20 sweets be put into bags so that every bag had the same number of sweets?** **How many bags would be packed each time?**

Greater Depth
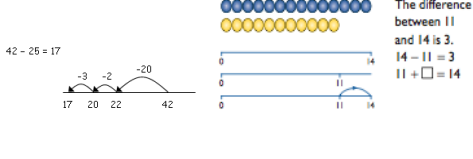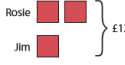
Addition	Subtraction	Multiplication	Division
✓ Partition into 5 and a bit when adding 6, 7, 8, or 9. ✓ Add 9 to a single–digit number by adding 10 then subtracting 1. ✓ Add 3 single digits up to 20. ✓ Begin to recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number	✓ Begin to recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. ✓ Choose and use the appropriate number operation (counting, add, subtract) and mental strategies to solve simple money or 'real life' problems.	✓ Counting in steps of equal sizes and treating a group of, for example, five objects as one unit of five. ✓ Understanding the commutative property of multiplication, that 2 × 5 is equivalent to 5 × 2.	✓ Solve division problems that require grouping into different sets.

problems.
- ✓ Choose and use the appropriate number operation (counting, add, subtract) and mental strategies to solve simple money or 'real life' problems.
- ✓ Solve one-step problems that involve addition up to 100 (manipulatives).
- ✓ Solve missing number problems up to 100 (manipulatives).

- ✓ Solve one-step problems that involve and missing number problems such as
  7 = __ - 9
- ✓ Solve one-step problems that involve subtraction from up to 100 (manipulatives).
- ✓ Solve missing number problems up to 100 (manipulatives).

Examples of Greater Depth			

2 + 4 = 6
4 + 2 = 6
2 + 4 = 4 + 2

'I can double any number, but I can only halve some numbers'.
Do you agree?

Captain Conjecture says, 'I can double any number, but I can only halve some numbers'.
Do you agree?
Explain your reasoning.
If you counted back from 50 in tens, would you say 0?
Can you explain?
How else could 20 sweets be put into bags so that every bag had the same number of sweets?
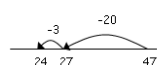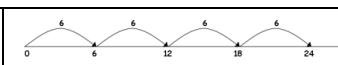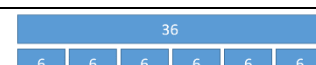How many bags would be packed each time?

$4 + \boxed{4} = 8$
$8 - \boxed{4} = 4$

Year 2
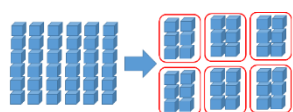
Addition	Subtraction	Multiplication	Division
✓ Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. ✓ Show that the addition of two numbers can be done in any order (commutative). ✓ Add numbers using concrete objects, pictorial representations, and mentally, including: a 2-digit number and 1s; a 2-digit number and 10s; two 2-digit numbers; adding three 1 digit numbers. ✓ Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. ✓ Solve addition problems using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods. ✓ Understand that sum and total indicate addition. ✓ Check addition calculations by adding in a different order or using subtraction (inverse).	✓ Subtraction of one number from another cannot be commutative. ✓ Subtract numbers using concrete objects, pictorial representations, and mentally, including: a 2-digit number and 1s; a 2-digit number and 10s; two 2-digit numbers; adding three 1 digit numbers. ✓ Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. ✓ Solve subtraction problems using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods. ✓ Understand that difference indicates subtraction. ✓ Check subtraction calculations using addition calculations (inverse).	✓ Recall and use multiplication facts for the 2, 5 and 10 times tables. ✓ Recognise odd and even numbers. ✓ Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (x) and equals (=) sign. ✓ Solve problems involving multiplication using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in contexts. ✓ Calculate mentally using multiplication facts for the 2, 5 and 10 multiplication tables.	✓ Recall and use division facts for the 2, 5 and 10 times tables. ✓ Recognise odd and even numbers. ✓ Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) sign. ✓ Solve problems involving division, using materials, arrays, repeated addition, sharing, mental methods and division facts, including problems in contexts. ✓ Calculate mentally using multiplication and division facts for the 2, 5 and 10 multiplication tables.
Examples of ARE			

35 + 28 = 63

34 + 23 = 57

47 - 4 = 43   47 - 30 = 17

47 - 23 = 24

5 x 3 = 15
3 x 5 = 15
5 x 2 = 10
2 x 5 = 10

Children should have experience of scaling. Exploring concepts such as 'This is twice as long as/ half as long as/ 3 times as tall as'.

I'm 3 times as tall as you. I'm 3 metres tall.

I'm only 1 metre tall.

6 sweets shared between 2 people, how many do they each get?

✓ Use the inverse relationship between addition and subtraction to solve missing number problems. ✓ Recall addition facts to 20 fluently, deriving related facts to 100. ✓ When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given 5 + 8 + 2 it is easier to add 8 + 2 first than to begin with 5 + 8. ✓ Children should have an understanding of calculations with similar digits. For example, 2 + 5 = 7 so 20 + 50 = 70.	✓ Use the inverse relationship between addition and subtraction to solve missing number problems. ✓ Recall subtraction facts to 20 fluently, deriving related facts to 100. ✓ When subtracting tricky numbers, children should use their number bond knowledge to simplify this. For example, 63 – 27 = 50 – 20 and 13 – 7 = 36. ✓ Children should have an understanding of calculations with similar digits. For example, 8 - 5 = 3 so 80 - 50 = 30.	✓ Show that the multiplication of two numbers can be done in any order (commutative). ✓ Use a variety of language to describe multiplication.	✓ Show that the division of one number by another is not commutative. ✓ Use a variety of language to describe division.

Examples of Greater Depth

Year 3

Addition	Subtraction	Multiplication	Division
✓ Add numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three digit number and hundreds. ✓ Add numbers with up to three digits, using formal written methods of columnar addition. ✓ Solve problems, including missing number problems, using number facts, place value, and more complex addition. ✓ Add amounts of money to give change, using both £ and p in practical contexts. ✓ Use understanding of place value and partitioning to develop methods for addition with larger numbers. ✓ Understand the structure of situations that require addition. ✓ Continue to use addition facts to 20 and derive related facts up to 100. ✓ Count from 0 in multiples of 100 ✓ Find 10 or 100 more or less than a given number ✓ Recognise the place value of each digit in a three-digit number (hundreds, tens, ones) ✓ Read and write numbers up to 1000 in numerals and in words	✓ Subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three digit number and hundreds. ✓ Subtract numbers with up to three digits, using formal written methods of columnar subtraction. ✓ Solve problems, including missing number problems, using number facts, place value, and more complex subtraction. ✓ Subtract amounts of money to give change, using both £ and p in practical contexts. ✓ Use understanding of place value and partitioning to develop methods for subtraction with larger numbers. ✓	✓ Recall and use multiplication facts for the 3, 4 and 8 multiplication tables. ✓ Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (x) and equals (=) signs. ✓ Solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in context. ✓ Show that multiplication of two numbers can be done in any order (commutative). ✓ Solve problems including missing number problems involving multiplication and positive integer scaling problems. ✓ Write and calculate mathematical statements for multiplication using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental methods and progressing to formal written methods. ✓ Develop recall of number facts linking addition and multiplication. ✓ Count from 0 in multiples of 4, 8 and 50.	✓ Recall and use division facts for the 3, 4 and 8 multiplication tables. ✓ Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs. ✓ Solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in context. ✓ Solve problems including missing number problems involving division. ✓ Write and calculate mathematical statements for division using the multiplication tables they know, including for two-digit numbers times one-digit numbers, using mental methods and progressing to formal written methods.

Examples of ARE

267 = 200 + 60 + 7
+124   100 + 20 + 4
       300 + 80 + 11 = 391

38 + 86 = 124

625
+ 48
  673

47 − 23 = 24

754 = 700 + 50 + 4
− 86   80 + 6
  = 700 + 40 + 14
        80 + 6
  = 600 + 140 + 14
        80 + 6
    600 + 60 + 8

Complete the following:

$3 \times \square = 12$ $4 \times \square = 20$

$\square \times 3 = 15$ $8 \times \square = 24$

36

How many egg boxes would you need if Helen the hen laid 50 eggs?

Greater Depth			
✓ Check addition calculations using subtraction and addition and subtraction calculations using rounding (*) ✓ Estimate the answer to a calculation and use inverse operations to check answers.	✓ Understand the structure of situations that require subtraction. ✓ Check addition calculations using subtraction and addition and subtraction calculations using rounding (*) ✓ Estimate the answer to a calculation and use inverse operations to check answers.	✓ Understand the structure of situations that require multiplication.	✓ Show that division of one number by another cannot be commutative.

Examples of Greater Depth			
Flo and Jim are answering a problem: Danny has read 62 pages of the class book, Jack has read 43. How many more pages has Danny read than Jack? Flo does the calculation 62 + 43. Jim does the calculation 62–43. Who is correct? Explain how you know. Sophie has five coins in her pocket. How much money might she have? What is the greatest amount she can have? What is the least amount she can have? If all the coins are different: What is the greatest amount she can have? What is the least amount she can have? $\square\ \square\ \square\ +\ \square\ \square\ \square\ =$ Throw a 1 to 6 dice and each time record the digit in one of the place holders. The aim is to get the sum as low as possible. Repeat to find different answers. Could you have done it in a different way?	Flo and Jim are answering a problem: Danny has read 62 pages of the class book, Jack has read 43. How many more pages has Danny read than Jack? Flo does the calculation 62 + 43. Jim does the calculation 62–43. Who is correct? Explain how you know. Sophie has five coins in her pocket. How much money might she have? What is the greatest amount she can have? What is the least amount she can have? If all the coins are different: What is the greatest amount she can have? What is the least amount she can have?	Roger has 96 patio slabs. Using all of the slabs find three different ways that he can arrange the slabs to form a rectangular patio. $\square\ \square \times \square = ?$ Putting the digits 1, 2 and 3 in the empty boxes, how many different calculations can you make? Which one gives the largest answer? Which one gives the smallest answer? Find the missing digits. $\begin{array}{r} 2\,\square \\ \times\ 8 \\ \hline 1\,7\,6 \end{array}$ $\begin{array}{r} 2\,\square \\ \times\ \square \\ \hline 1\,1\,2 \end{array}$ $\begin{array}{r} 1\,\square\,4 \\ \times\ \square \\ \hline 7\,3\,6 \end{array}$	Sam is planting onions in the vegetable plot in his garden. He arranges the onions into rows of 4 and has two left over. He then arranges them into rows of 3 and has none left over. How many onions might he have had? Explain your reasoning.

Year 4

Addition	Subtraction	Multiplication	Division
✓ Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate. ✓ Estimate and use inverse operations to check answers to a calculation. ✓ Solve addition two step problems in contexts, deciding which operations and methods to use and why. ✓ Find 1000 more than a given number ✓ Count in multiples of 1000; through zero to include negative numbers ✓ Recognise the place value of each digit in a four digit number (thousands, hundreds, tens, ones) ✓ Identify, represent and estimate numbers to 10 000 using different representations ✓ Round whole numbers to 10,000 to the nearest 10, 100 or 1000 ✓ Understand the inverse relationship between addition and subtraction ✓ Use commutativity in mental calculations ✓ Use factor pairs in mental calculations	✓ Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate. ✓ Estimate and use inverse operations to check answers to a calculation. ✓ Solve subtraction two step problems in contexts, deciding which operations and methods to use and why. ✓ Find 1000 less than a given number ✓ Count in multiples of 1000; count backwards through zero to include negative numbers ✓ Recognise the place value of each digit in a four digit ✓ Understand the inverse relationship between addition and subtraction ✓ Use factor pairs in mental calculations ✓ Mentally subtract pairs of three-digit and four digit numbers ✓ Use subtraction facts to 100 and derive related facts up to 1000	✓ Recall and use multiplication facts for multiplication tables up to 12 x 12. ✓ Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. ✓ Recognise and use factor pairs and commutatively in mental calculations. ✓ Multiply two digit and three digit numbers by a one digit number using formal written layout. ✓ Count in multiples of 6, 7, 9 and 25. ✓ Use the distributive law to multiply two digit numbers by one digit ✓ Recognise factor pairs. ✓ Check answers to multiplication and division calculations using rounding	✓ Recall and use division facts for multiplication tables up to 12 x 12. ✓ Use place value, known and derived facts to divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. ✓ Recognise factor pairs. ✓ Divide two digit and three-digit numbers by a one digit number using formal written layout ✓ Check answers to multiplication and division calculations using rounding

Addition			
✓ Mentally add pairs of three-digit and four digit numbers ✓ Use addition facts to 100 and derive related facts up to 1000			

Examples of ARE

Greater Depth

| ✓ Solve problems involving multiplying and adding
✓ Check answers to addition and subtraction calculations by estimating and using inverse operations
✓ Solve calculation problems involving two-step addition and subtraction in context, deciding which operations to use and why | ✓ Check answers to addition and subtraction calculations by estimating and using inverse operations | ✓ Check answers to multiplication and division calculations using rounding | ✓ Check answers to multiplication and division calculations using rounding |

Examples of Greater Depth

8 girls share 6 bars of chocolate equally. 12 boys share 9 bars of chocolate equally.
Clare says each girl got more to eat as there were fewer of them. Rob says each boy got more to eat as they had more chocolate to share.
Explain why Clare and Rob are both wrong.

True or false?
$7 \times 6 = 7 \times 3 \times 2$
$7 \times 6 = 7 \times 3 + 3$
Sally has 9 times as many football cards as Sam. Together they have 150 cards. How many more cards does Sally have than Sam?

Year 5

Addition	Subtraction	Multiplication	Division
✓ Read, write, order and compare numbers to at least 1000000 and determine the value of each digit. ✓ Count forwards or backwards in steps of powers of 10 for any given number up to 1000000. ✓ Interpret negative numbers in context, count forwards with positive and negative whole numbers including through zero. ✓ Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000 ✓ Add mentally with increasingly large numbers. ✓ Add whole numbers with more than 4 digits, including using formal written methods (columnar addition) ✓ Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. ✓ Count forwards with positive and negative whole	✓ Count forwards or backwards in steps of powers of 10 for any given number up to 1000000. ✓ Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000 ✓ Subtract mentally with increasingly large numbers. ✓ Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction) ✓ Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. ✓ Count backwards with positive and negative whole numbers, including through zero ✓ Order and compare numbers to at least 1 000 000 ✓ Continue to develop knowledge of subtraction facts and to derive related facts	✓ Multiply numbers up to 4 digits by a one- or two digit number using a formal written method, including both compact and long multiplication for two-digit numbers ✓ Multiply numbers mentally drawing upon known facts. ✓ Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. ✓ Recognise and use square numbers and cube numbers and the notation for squared (2) and cubed (3) ✓ Solve problems involving multiplication including using their knowledge of factors and multiples, squares and cubes. ✓ Solve problems involving addition and subtraction, multiplication and division and a combination of these, including understanding the use of the equals sign.	✓ Divide numbers up to 4 digits by a one-digit number using formal written method of short division and interpret remainders appropriately for the context ✓ 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. ✓ Divide numbers mentally drawing upon known facts. ✓ Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. ✓ Recognise and use square numbers and cube numbers and the notation for squared (2) and cubed (3) ✓ Solve problems involving division including using their knowledge of factors and multiples, squares and cubes. ✓ Solve problems involving addition and subtraction,

numbers, including through zero ✓ Order and compare numbers to at least 1 000 000		✓ Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. ✓ Establish whether a number up to 100 is prime and recall prime numbers up to 19. ✓ Continue to count in any multiples of 2 to 10, 25 and 50 ✓ Continue to use the distributive law to partition numbers when multiplying them ✓ Multiply whole numbers and those involving decimals by 10, 100 and 1000 ✓ Identify multiples and factors, including all factor pairs of a number, and common factors of 2 numbers	multiplication and division and a combination of these, including understanding the use of the equals sign. ✓ Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. ✓ Establish whether a number up to 100 is prime and recall prime numbers up to 19. ✓ Continue to count in any multiples of 2 to 10, 25 and 50 ✓ Divide whole numbers and those involving decimals by 10, 100 and 1000 ✓ Identify multiples and factors, including all factor pairs of a number, and common factors of 2 numbers ✓ Divide one- or two-digit numbers by 1000, identifying the value of the digits in the answer as ones, tenths, hundredths and thousandths

Examples of ARE

'When working with whole numbers, if you add two 2-digit numbers together the answer cannot be a 4-digit number.' Do you agree? Explain your reasoning.

The table shows the cost of train tickets from different cities.

What is the total cost for a return journey to York for one adult and two children?
How much more does it cost for two adults to make a single journey to Hull than to Leeds?

		York	Hull	Leeds
Adult	Single	£13·50	£16·60	£11·00
	Return	£24·50	£30·00	£20·00
Child	Single	£9·75	£11·00	£8·00
	Return	£15·00	£18·50	£13·50

3254 + ☐ = 7999
2431 = ☐ − 3456
6373 − ☐ = 3581
6719 = ☐ − 4562

☐ − ☐ = ☐
☐ − ☐ = ☐

8 is a multiple of 4 and a factor of 16
6 is a multiple of 3 and a factor of ☐
☐ is a multiple of 5 and a factor of ☐
☐ is a multiple of ☐ and a factor of ☐

Fill in the missing numbers in this multiplication pyramid.

A 50 cm length of wood is cut into 4 cm pieces.
How many 4 cm pieces are cut and how much wood is left over?

Fill in the blanks to represent the problem as division:
☐ ÷ ☐ = ☐ remainder ☐
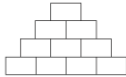Fill in the blanks to represent the problem as multiplication:
☐ × ☐ + ☐ = 50

Fill in the missing numbers:
8 ÷ 2 = ☐ ÷ 4 = 32 ÷ ☐ = 64 ÷ ☐

Sally's book is 92 pages long.

If she reads seven pages each day, how long will she take to finish her book?

Greater Depth

✓ Solve addition multi-step problems in contexts deciding which operations and methods to use and why. ✓ Continue to develop knowledge of addition facts and derive related facts ✓ Solve addition multi step problems in familiar contexts, deciding which operations and methods to use and why	✓ Solve subtraction multi-step problems in contexts deciding which operations and methods to use and why. ✓ Solve subtraction multi step problems in familiar contexts, deciding which operations and methods to use and why	✓ Solve problems involving scaling by simple fractions and problems involving simple rates ✓ Check answers to calculations using the inverse	✓ Check answers to calculations using the inverse (+)

Examples of Greater Depth

Using this number statement, 5222 – 3111 = 5223 – 3112 write three more pairs of equivalent calculations.	'If you keep subtracting 3 from 397 you will eventually reach 0.' **Do you agree? Explain your reasoning.** Sam and Tom have £67·80 between them. If Sam has £6·20 more than Tom, how much does Tom have?	Put the numbers 1, 2, 3 and 4 in the bottom row of this multiplication pyramid in any order you like. What different numbers can you get on the top of the number pyramid? How can you make the largest number? Explain your reasoning.	A 1 m piece of ribbon is cut into equal pieces and a piece measuring 4 cm remains. What might the lengths of the equal parts be? In how many different ways can the ribbon be cut into equal pieces?

Year 6

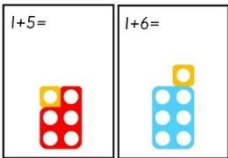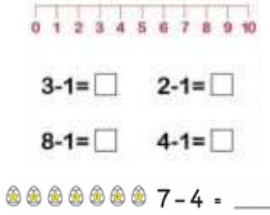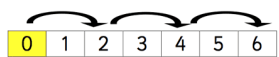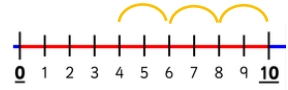| Addition	Subtraction	Multiplication	Division
✓ Solve problems which require answers to be rounded to specified degrees of accuracy. ✓ Read, write, order and compare numbers up to10 000 000 and determine the value of each digit. ✓ Round any whole number to a required degree of	✓ Solve problems which require answers to be rounded to specified degrees of accuracy. ✓ Read, write, order and compare numbers up to10 000 000 and determine the value of each digit. ✓ Round any whole number to a required degree of	✓ Identify the value of each digit in numbers given to three decimal places and multiply numbers by 10, 100 and 1000 giving answers up to 3 decimal places (dp). ✓ Multiply one digit numbers with up to 2dp by whole numbers.	✓ Use written division methods in cases where the answer has up to two decimal places ✓ Divide numbers up to 4 digits by a two-digit whole number using the formal methods of short or long division, and interpret remainders as appropriate for

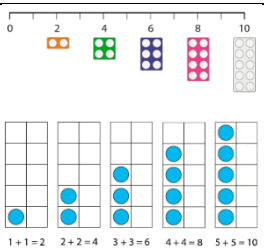|			
accuracy.	accuracy.	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.	the context as whole numbers, fractions or by rounding
✓ Use negative numbers in context, and calculate intervals across zero.	✓ Use negative numbers in context, and calculate intervals across zero.	✓ Compare and order fractions, including fractions > 1	✓ Associate a fraction with division
✓ Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.	✓ Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.	✓ Generate and describe linear number sequences (with fractions)	✓ Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
✓ Perform mental calculations, including with mixed operations and large numbers.	✓ Perform mental calculations, including with mixed operations and large numbers.	✓ Multiply simple pairs of proper fractions, writing the answer in its simplest form.	✓ Consolidate recognition of the percent symbol and understanding that percent relates to 'number of parts per hundred
✓ Identify common factors, common multiples and prime numbers.	✓ Identify common factors, common multiples and prime numbers.	✓ Multiply multi-digit number up to 4 digits by a 2 digit number using the formal written method of long multiplication.	✓ Divide proper fractions by whole numbers
✓ Use their knowledge of the order of operations to carry out calculations involving the four operations.	✓ Use their knowledge of the order of operations to carry out calculations involving the four operations.	✓ Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction.	✓ Divide numbers up to 4 digits by a 2 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.
✓ Solve problems involving addition, subtraction, multiplication and division.	✓ Solve problems involving addition, subtraction, multiplication and division.	✓ Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.	✓ Divide numbers up to 4 digits by a 2 digit number using the formal written method of short division, interpreting remainders according to context.
✓ Use estimation to check answers	✓ Use estimation to check answers	✓ Compare and order fractions whose denominators are multiples of the same number.	✓ Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
✓ Read, write, order and compare numbers with up to three decimal places.	✓ Read, write, order and compare numbers with up to three decimal places.	✓ Identify, name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths.	
✓ Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.	✓ Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.	✓ Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements >1 as a mixed number [for example 2 5 + 4 5 = 6 5 = 1 1 5].	
✓ Round decimals with two decimal places to the nearest whole number and to one decimal place.	✓ Round decimals with two decimal places to the nearest whole number and to one decimal place.	✓ Add and subtract fractions with the same denominator and denominators that are multiples of the same number.	
✓ Solve problems involving number up to three decimal places.	✓ Solve problems involving number up to three decimal places.	✓ Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.	
✓ Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	✓ Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.	✓ Read and write decimal numbers as fractions [for example 0.71 = 71 100].	
✓ Read and write numbers to 10 000 000 and determine the value of digits	✓ Read and write numbers to 10 000 000 and determine the value of digits	✓ Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	
✓ Order and compare numbers up to 10 000 000	✓ Order and compare numbers up to 10 000 000	✓ Consolidate counting in multiples of 2, through to 10, 25 and 50	
✓ Round whole numbers to 10 000 000 to a required degree of accuracy	✓ Round whole numbers to 10 000 000 to a required degree of accuracy	✓ Identify common factors, common multiples and prime numbers greater than 100	
✓ Use knowledge of the order of operations	✓ Use knowledge of the order of operations	✓ Solve multi step addition and subtraction problems in less familiar contexts, deciding which operations and methods to use and why	
✓ Perform mental calculations, including with mixed operations and large numbers	✓ Perform mental calculations, including with mixed operations and large numbers	✓ Multiply multi digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	
✓ Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.	✓ Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.		

Examples of ARE

Calculate 36·2 + 19·8

Choose digits to go in the empty boxes to make these number sentences true.

14 781 – 6[ ]53 = 8528

23·12 + 22·[ ] = 45·23

Compare 31 + 9 × 7 and (31 + 9) × 7
What's the same? What's different?

Choose operations to go in the empty boxes to make these number sentences true.

6[ ]3[ ]7 = 16

6[ ]3[ ]7 = 27

6[ ]3[ ]7 = 9

Put brackets in these number sentences so that they are true.

12 – 2 × 5 = 50

12 – 8 – 5 = 9

10 × 8 – 3 × 5 = 250

A shop sells magazines and comics. Freya buys a magazine and a comic. She pays £2·50. Evie buys a magazine and two comics. She pays £3·90. How much does a comic cost? How much does a magazine cost?

A shop sells boxes of chocolates. One box costs £3·99. A second box costs £2·60. A third box costs £6·45. What is the difference in price between the most and least expensive boxes?
The shop also sells packets of sweets. One packet costs £1·39. Ramesh has a £10 note and he wants to buy the chocolates costing £2·60. How many packets of sweets can he also buy?

Two numbers have a difference of 2·38. The smaller number is 3·12. What is the bigger number?

Two numbers have a difference of 2·3. They are both less than 10. What could the numbers be?

It is correct that 273 × 32 = 8736. Use this fact to work out:
- 27·3 × 3·2
- 2·73 × 32 000
- 873·6 ÷ 0·32
- 87·36 ÷ 27·3
- 8736 ÷ 16
- 4368 ÷ 1·6

All the pupils in a school were asked to choose between an adventure park and the seaside for a school trip.
They voted, and the result was a ratio of 5:3 in favour of the adventure park.
125 children voted in favour of going to the adventure park.
How many children voted in favour of going to the seaside?

Mary and Alan each buy 12 tins of tomatoes.
Miriam buys 3 packs each containing 4 tins. A pack of 4 costs £1·40.
Alan buys 2 packs each containing 6 cans. A pack of 6 costs £1·90.
Who gets the most change from a £5 note?

It is correct that 273 × 32 = 8736. Use this fact to work out:
- 27·3 × 3·2
- 2·73 × 32 000
- 873·6 ÷ 0·32
- 87·36 ÷ 27·3
- 8736 ÷ 16
- 4368 ÷ 1·6

A box of labels costs £24.
There are 100 sheets in the box.
There are 10 labels on each sheet.
Calculate the cost of one label, in pence.

Greater Depth

A shop sells boxes of chocolates costing £2·60. The shop also sells packets of sweets. One packet costs £1·39. Ramesh has a £10 note and he wants to buy one box of chocolates.
Sara says that Ramesh can work out how many packets of sweets he can buy using the number sentence 10 – 2·60 ÷ 1·39.

Do you agree or disagree with Sara?
If you disagree, what number sentence do you think Ramesh should use?

Explain your reasoning.

Can you use five of the digits 1 to 9 to make this number sentence true?

[ ][ ]·[ ] + [ ]·[ ] = 31·7

Can you find other sets of five of the digits 1 to 9 that make the sentence true?

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x and y represent whole numbers. Their sum is 1000.

Can the difference between x and y be:
- 100?
- any whole number?
- greater than x?

A shop sells magazines and comics. Last week Arthur bought a magazine and a comic. He can't remember exactly what he paid, but he thinks he paid £1·76.
Yesterday he bought a magazine and four comics. He paid £4·30.

Do you think he is remembering correctly when he says that he paid £1·76 last week?

Fill in the missing numbers to make these number sentences true.

[ ] × [ ] = 864

[ ] × [ ] × [ ] = 864

A box of labels costs £63.
There are 140 sheets in the box.
There are 15 labels on each sheet.
Sara, Ramesh and Trevor want to calculate the cost of one label, in pence.
Ramesh uses the number sentence (6300 ÷ 140) × 15.
Sara uses the number sentence 63 ÷ 1·4 ÷ 15.
Trevor uses the number sentence (15 × 140) ÷ 6300.

Who is using the right number sentence? Explain your choice.

Examples of Greater Depth

Can you use five of the digits 1 to 9 to make this number sentence true?

[ ][ ]·[ ] + [ ]·[ ] = 31·7

Can you find other sets of five of the digits 1 to 9 that make the sentence true?

Write different number sentences using the digits 2, 3, 5 and 8 before the equals sign, using:
- **one operation**
- **two operations but no brackets**
- **two operations and brackets.**

Can you write a number sentence using the digits 2, 3, 5 and 8 before the equals sign, which has the same answer as another number sentence using the digits 2, 3, 5 and 8 but which is a different sentence?

Two numbers have a difference of 2·38. What could the numbers be if:
- **the two numbers add up to 6?**
- **one of the numbers is three times as big as the other number?**

Two numbers have a difference of 2·3. To the nearest 10, they are both 10.
What could the numbers be?

A shop sells magazines and comics. Last week Arthur bought a magazine and a comic. He can't remember exactly what he paid, but he thinks he paid £1·76.
Yesterday he bought a magazine and four comics. He paid £4·30.
Do you think he is remembering correctly when he says that he paid £1·76 last week?

Fill in the missing numbers to make these number sentences true.

[ ] × [ ] = 864

[ ] × [ ] × [ ] = 864

Which calculation is the odd one out?
753 × 1·8
(75·3 × 3) × 6
753 + 753 ÷ 5 × 4
7·53 × 1800
753 × 2 – 753 × 0·2
750 × 1·8 + 3 × 1·8
Explain your reasoning.

All the pupils in a school were asked to choose between an art gallery and a science museum for a school trip. The result was a ratio of 12:7 in favour of the science museum.
Five pupils were off school and didn't vote.
Every pupil went on the trip to the science museum the following week.
After the trip there is a news headline on the school website that says 'All 700 pupils in the school went to the science museum.'
Do you think that this news headline is correct? Explain your reasoning.

A box of labels costs £63.
There are 140 sheets in the box.
There are 15 labels on each sheet.
Sara, Ramesh and Trevor want to calculate the cost of one label, in pence.
Ramesh uses the number sentence (6300 ÷ 140) × 15.
Sara uses the number sentence 63 ÷ 1·4 ÷ 15.
Trevor uses the number sentence (15 × 140) ÷ 6300.
Who is using the right number sentence? Explain your choice.

Language

	Addition	Subtraction	Multiplication	Division	
Reception	**In practical activities and discussion, beginning to use the vocabulary involved in adding.** ✓ more ✓ add	**In practical activities and discussion, beginning to use the vocabulary involved in subtracting.** ✓ less ✓ fewer	**In practical activities and discussion, beginning to use the vocabulary involved in multiplying.** ✓ lots of	**In practical activities and discussion, beginning to use the vocabulary involved in halving.** ✓ share ✓ groups of	
Year 1	**Understand the operation of addition (as how many more) and use the related vocabulary.** ✓ total ✓ sum ✓ ten more ✓ digit ✓ numeral ✓ order ✓ a different order ✓ tens ✓ ones ✓ plus ✓ number bonds ✓ number line ✓ make ✓ altogether ✓ equals ✓ is the same as ✓ How many more to make …? ✓ How much more is …?	**Understand the operation of subtraction (as difference) and use the related vocabulary.** ✓ leaves ✓ takeaway ✓ ten less ✓ above ✓ below ✓ difference between ✓ subtract ✓ minus ✓ How many fewer is … than…? ✓ How much less is…? ✓ How many more is…than…?	**Explain what doubling is.** ✓ double ✓ once ✓ twice ✓ times ✓ repeated addition ✓ row	**Explain what halving is.** ✓ half ✓ halve ✓ share ✓ share equally ✓ group in pairs ✓ threes etc. ✓ equal groups of ✓ divided by	
Year 2	✓ figure(s) ✓ value ✓ inverse ✓ number facts ✓ place value	✓ compare ✓ halfway between ✓ inverse ✓ left over ✓ difference ✓ number facts ✓ place value	✓ near double ✓ multiply ✓ multiply by ✓ number facts	✓ divide ✓ divided by ✓ grouped into ✓ groups of ✓ number facts	
Year 3	✓ column addition ✓ tens ✓ ones ✓ hundreds ✓ estimate ✓ identify	✓ column subtraction ✓ exchange ✓ tens ✓ ones ✓ hundreds ✓ estimate ✓ identify	✓ product ✓ multiple ✓ multiples of… ✓ fifty ✓ one hundred ✓ scale up ✓ times	✓ array ✓ left over ✓ remainder	
Year 4	✓ tenths ✓ hundredths ✓ decimal ✓ round ✓ nearest ✓ thousand more ✓ positive ✓ negative ✓ Roman Numerals I to C ✓ solve problems	✓ tenths ✓ hundredths ✓ decimal ✓ round ✓ nearest ✓ thousand less ✓ negative ✓ Roman Numerals I to C ✓ solve problems	✓ multiplication facts ✓ inverse operation ✓ derive ✓ solve problems	✓ division facts ✓ inverse operation ✓ derive ✓ divided into ✓ solve problems	
Year 5	✓ written addition method ✓ composite numbers ✓ approximate ✓ calculate statements	✓ written subtraction method ✓ composite numbers ✓ approximate ✓ calculate statements	✓ powers of 10 ✓ factor pairs ✓ prime factors ✓ square number ✓ cubed number ✓ formal written multiplication ✓ prime number ✓ calculate statements	✓ factor pairs ✓ prime factors ✓ prime number ✓ formal written division ✓ calculate statements	
Year 6	✓ million ✓ order of operations (BODMAS) ✓ n^{th} term	✓ million ✓ order of operations (BODMAS) ✓ n^{th} term	✓ common factors ✓ common multiples ✓ n^{th} term ✓ order of operations (BODMAS)	✓ common factors ✓ common multiples ✓ n^{th} term ✓ order of operations (BODMAS)	

Standard Written Form

	Addition	Subtraction	Multiplication	Division
Reception				
Year 1				
Year 2	59 ₁43+ 102	⁶7̷³1 49- 24	8 x 5 = 40 	35 ÷ 5 = 7
Year 3	523 393+ ₁916	⁴5̷²³1 393- 130	59 6x 54 (6x9) 300 (6x50) 354	8)32̄ with 4 above
Year 4	1,312 3,₁094+ 4,406	⁶,²¹7³1 1,093- 5,180	159 16x 954 ₁1,590+ 2,544	7)945̄ with 135 above
Year 5	13,123 30,₁943+ 44,066	6²,¹7⁴³1 10,923- 51,820	2259 6x 54 300 1,200 12,000+ 13,554	6)1679̄ with 279 r 5 above

Year 6				

	613,123
	130,943+
	744,066
		61$\overset{1}{2}$,$\overset{1}{7}$43
		100,923-
		511,820
			2259
			46x
			13,554
			90,360+
			103,914
				0389.739
				23⟌8964
				23 69-
				46 206
				69 184-
				92 0224
				115 207-
				138 0170
				161 161-
				184 0090
				207 69-
				    210
				   207-
				   003