

The Rydal Academy

Calculations Policy

Accepted by: The Rydal Academy LGB May 2019

Approving Body: Local Governing Body

Committee: LGB

Review Cycle: 3 years

Last reviewed: December 2023

Date for next review: December 2026



Here at The Rydal Academy, our Calculation Policy has been created to meet the expectations of the new national curriculum but most importantly the learning needs of our children. The methods chosen match the National Curriculum but have also been specifically selected after consideration of our children's learning styles.

Age Expectations

This policy has been organised by year group, considering the National Curriculum 2014 expectations. The new curriculum focuses on skills, depth of knowledge and mastering the subject. This leads children to working on more complex and richer problems, rather than the teaching of new methods, and supports their 'mastering' of Mathematics. Throughout our primary Mathematics learning journey, there will continue to be examples of further support and challenge for children dependent on their level of individual need.

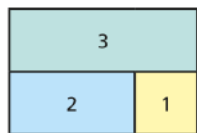
Year 1 - Addition

Adding with numbers up to 20

Children should use a variety of manipulatives and pictorial representations to add. They should learn strategies such as counting in ones, counting on from the greatest number and counting on the smaller number. These strategies should then be transferred to their mental strategies.

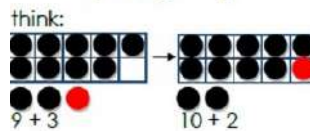
Variation

$3 + 4 =$ "I know that $14 - 4 = 10$,
 so $14 - 5$ must $= 9$."
 $3 + 5 =$ "I know that $9 + 1 = 10$,
 so $9 + 2$ must $= 11$."
 $3 + 6 =$



Bar model.

$$9 + 3 = ?$$



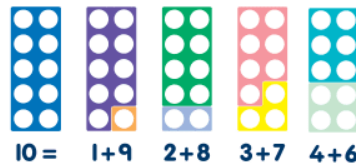
Number bond facts on a tens



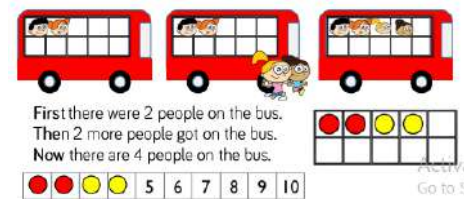
"I know that $8 + 3 = 11$,
 so $11 - 8$ must $= 3$."

"I know that $4 + 4 = 8$,
 so $8 - 4$ must $= 4$."

"I know that $9 + 1 = 10$,
 so $10 - 9$ must $= 1$."

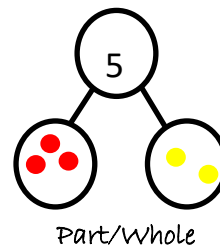


'First, then, now' structure.'

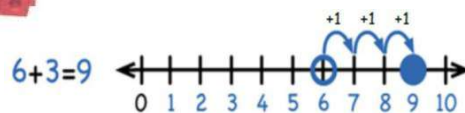


$$6 + 3 = 9$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Part/Whole



Near dou-

"I know that $4 + 4 = 8$,
 so $4 + 5$ must $= 9$."

Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, one more, two more ... ten more, How many more to make ...? How many more is ... than ...? How much more is ...? Near double, equals, is the same as, number bonds/pairs, missing number.

Key Skills

- Reading and writing numbers to 100 in numerals
- Represent and use number bonds and related subtraction facts within 20.
- Count to and over 100, forward from any number in the ones.
- Counting in multiples of 2, 5 and 10 from any given number.
- Solving simple one step addition problems, using pictorial or manipulative representations.
- Given a number, count on one more.
- Read and write the addition (+) and equals (=) sign and use them in a number sentence in different positions within each calculation.
- Solve addition number sentences and missing number problems: E.g. $7 + 4 = ?$, $1 + 2 + 1 = ?$, $? + ? = 9$

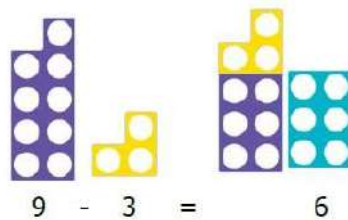
Year 1 - Subtraction

Subtracting from numbers up to 20

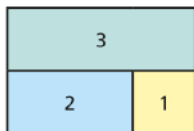
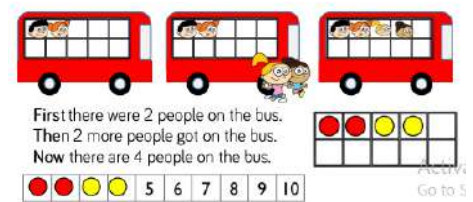
Children should use a variety of manipulatives and pictorial representations to subtract. They should learn strategies to understand that subtraction is not only taking away, but also the difference or distance between two numbers. These strategies should then be transferred to their mental strategies.

Variation

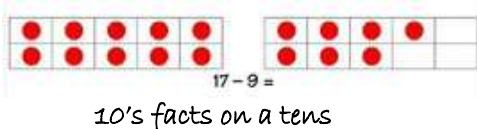
$10 - 4 =$
 "I know that $14 - 4 = 10$,
 so $14 - 5$ must $= 9$."
 $10 - 3 =$
 "I know that $9 + 1 = 10$,
 so $9 + 2$ must $= 11$."
 $10 - 2 =$



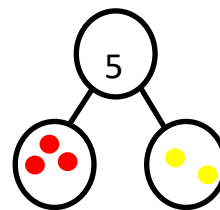
'First, then, now' struc-



Bar model.



10's facts on a tens



Part/Whole

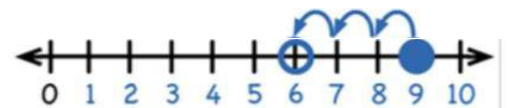
$$9 - 3 =$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

"I know that $8 + 3 = 11$,
 so $11 - 8$ must $= 3$."

"I know that $4 + 4 = 8$,
 so $8 - 4$ must $= 4$."

"I know that $9 + 1 = 10$,
 so $10 - 9$ must $= 1$."



Key Vocabulary

Subtract, take away, How many are left/left over? How many have gone? One less, two less, ten less ... How many fewer is ... than ...? How much less is ...? Difference between, equals, is the same as, number bonds/pairs, missing number, half, halve.

Key Skills

- Given a number, count one less.
- Count back from over 100 from any number in ones..
- Represent and use subtraction facts to 20 and within 20, including number bonds.
- Subtract with 1 digit numbers and 2 digit numbers., including 0.
- Solving simple one step subtraction problems, using pictorial or manipulative representations.

Year 1 - Multiplication

Repeated addition with objects, arrays and pictorial representatives.

Children should be exposed to many different multiplications based activities in a variety of contexts. Much of these will be repeated addition activities will be linked to counting in 2's, 5's and 10's.



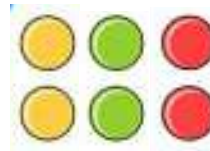
$$2 + 2 = 4$$



$$2 + 2 = 4$$



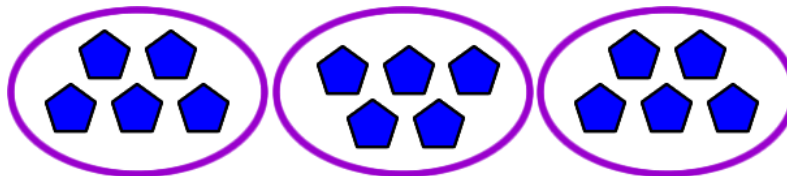
$$2 + 2 + 2 = 6$$



$$2 + 2 + 2 = 6$$



$$3 \times 5 =$$



3 of lots of 5

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, grouping, doubling, array, number patterns, repeated addition, lots of

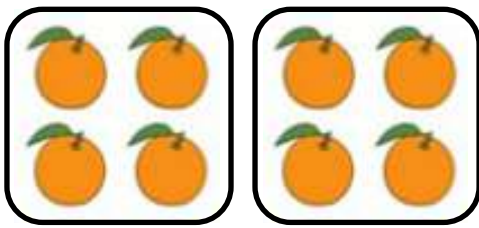
Key Skills

- **Count in multiples of 2's, 5's and 10's using manipulatives or pictorial representations.**
- **Make connections between arrays and counting in 2's, 5's and 10's.**
- Double using manipulatives or pictorial representations.
- Solve 1 step problems involving multiplications using manipulatives or pictorial representations.
- Solve practical problems solving activities, counting equal sets or groups including 2's, 5's and 10's. using manipulatives or pictorial representations.

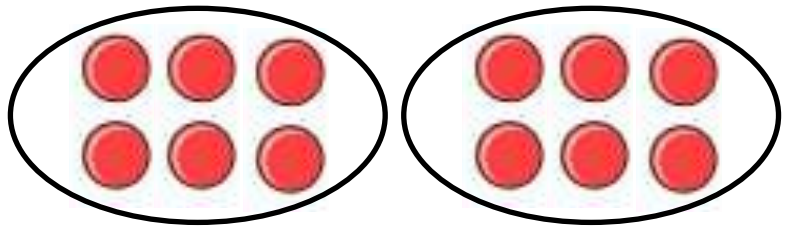
Year 1 - Division

Grouping and sharing small quantities without remainders.

Children should be exposed to many different division based activities in a variety of contexts. They will use manipulatives and pictorial representations to solve problems and begin to use counting in 2's, 5's and 10's to support their problem solving.



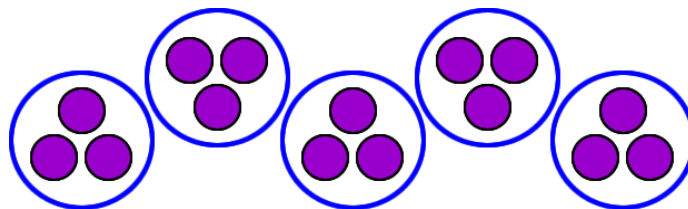
$$8 \div 2 = 4$$



$$12 \div 2 = 6$$



$$10 \div 2 = 5$$



$$15 \text{ shared into } 5$$

Key Vocabulary

Division, dividing, grouping, sharing, halving, array, number patterns

Key Skills

- Children to use grouping and sharing to understand division.
- Make connections between arrays and counting in 2's, 5's and 10's.
- Half using manipulatives or pictorial representations., understanding it is being split into 2 equal groups.
- Solve 1 step problems involving multiplications using manipulatives or pictorial representations.
- Solve practical problems solving activities, counting equal sets or groups including 2's, 5's and 10's. using manipulatives or pictorial representations.

Year 2 - Addition

Adding with 2 digit numbers.

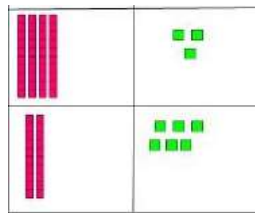
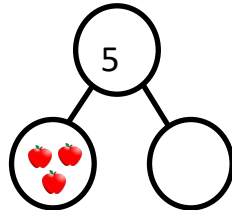
Children will continue to use a variety of manipulatives and pictorial representations to support their learning. Their written methods will move onto the traditional column method. In addition, they will develop their mental strategies, by using their knowledge on place value and partitioning.

Mental partitioning

$$71 + 23 =$$

$$70 + 20 =$$

$$1 + 3 =$$



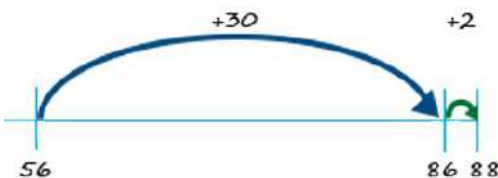
$$\begin{array}{r} 43 \\ + 26 \\ \hline \end{array}$$

Number bonds

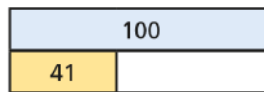
$$4 + 6 = 10$$

$$14 + 6 = 20$$

$$40 + 60 = 100$$



Complete the bar model.



Variation

$$3 + 4 =$$

$$3 + 5 = \text{"I know that } 14 - 4 = 10, \text{ so } 14 - 5 \text{ must} = 9.\text{"}$$

$$3 + 6 = \text{"I know that } 9 + 1 = 10, \text{ so } 9 + 2 \text{ must} = 11.\text{"}$$

$$3 + 7 =$$

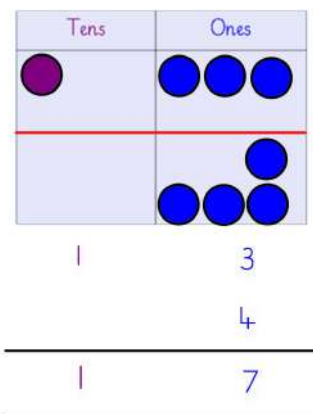
Near dou-

$$\text{"I know that } 4 + 4 = 8 \text{ so } 4 + 5 \text{ must} = 9.\text{"}$$

$$9 + 3 = ?$$

think:

Number bond facts on a



Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, double, near double, one more, two more ... ten

more ... one hundred more, How many more to make ...? How many more is ... than ...?

Equals, is the same as, number bonds/pairs/facts, tens boundary

Key Skills

- Add a 2 digit number to a ones number,
- Add a 2 digit number to a tens number.
- Add pairs of 2 digit numbers.
- Add three single digit numbers.
- Understand that adding can be done in any order. (Commutative law)
- Recall number bonds to 20.
- Recall multiples of 10, bonds to 100.
- Count in steps of 2, 3 and 5 forwards and backwards.
- Count in steps of 10 from any number.
- Understand that place value of 2 digit numbers (tens and ones)
- Compare and order numbers to 100 using comparison signs. ($<$ $>$ and $=$)
- Solve contextual addition problems using manipulatives and pictorial representations.

Year 2 - Subtraction

Subtracting with 2 digit numbers.

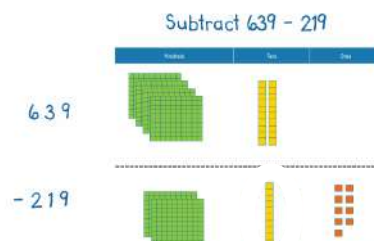
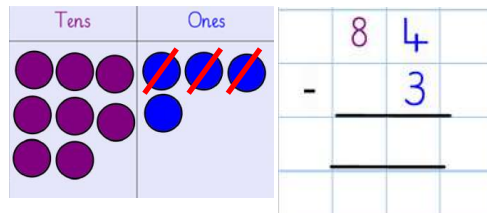
Children will continue to use a variety of manipulatives and pictorial representations to support their learning. Their written methods will move onto the traditional column method. In subtraction, they will develop their mental strategies, by using blank number lines to scaffold their mental strategies.

Mental partitioning

$$76 - 23 =$$

$$70 - 20 =$$

$$6 - 3 =$$

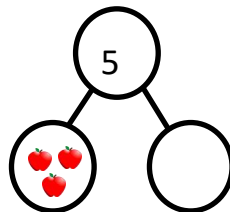


Number bonds

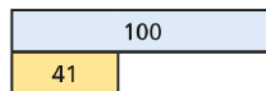
$$10 - 6 = 4$$

$$100 - 60 = 40$$

$$47 - 19 =$$



Complete the bar model.



Variation

$$3 + 4 =$$

$$3 + 5 = \text{"I know that } 14 - 4 = 10, \text{ so } 14 - 5 \text{ must} = 9.\text{"}$$

$$3 + 6 = \text{"I know that } 9 + 1 = 10, \text{ so } 9 + 2 \text{ must} = 11.\text{"}$$

$$3 + 7 =$$

"I know that $8 + 3 = 11$, so $11 - 8$ must = 3."

"I know that $4 + 4 = 8$, so $8 - 4$ must = 4."

"I know that $9 + 1 = 10$, so $10 - 9$ must = 1."

Near number bonds

$$11 - 5 =$$

$$10 - 5 =$$

$$9 - 5 =$$

Key Vocabulary

How many more to make ...? How many more is ... than ...? How much more is ...? subtract, take away, 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 less is ...? difference between, equals, is the same as number bonds/pairs/facts, tens boundary

Key Skills

- Understand the value of two digit numbers (tens and ones)
- Recall and use subtraction facts to 20 fluently.
- Use these facts to derive related facts to 20.
- Use manipulatives, pictorial representatives and mental strategies to subtract a one digit number from a two digit number, a two digit number from a tens number and 2 two digit numbers from each other.
- Understand that subtraction calculations cannot be done in any order.
- Use the inverse relationship between addition and subtraction to check calculations and solve missing number problems.
- Solve simple subtraction problems in context using written and mental methods.

Year 2 - Multiplication

Multiplying using arrays and repeated addition—2,5,10 x table facts

Children will use their knowledge of simple arrays and pictorial representations from Year 1. They will develop their understanding to make their own arrays, use repeated addition on a number line and use manipulatives to reason and problem solve.



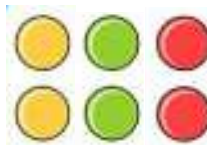
$$2 + 2 = 4$$



$$2 + 2 = 4$$



$$2 + 2 + 2 = 6$$

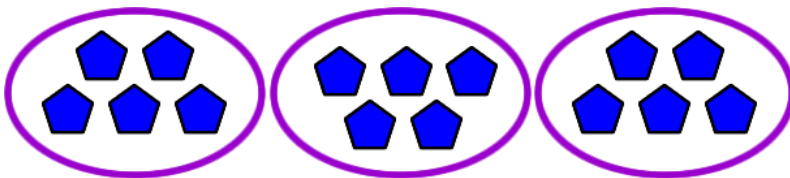


$$2 + 2 + 2 = 6$$



$$3 \times 5 = 15$$

40			
10	10	10	10



3 of lots of 5

10	10	10	10	10	10	10

Key Vocabulary

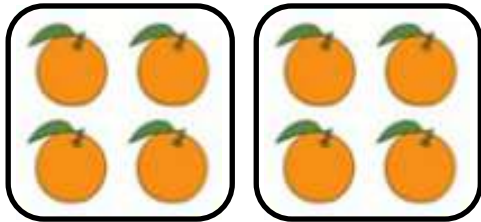
Multiplication, multiply, multiplied by, multiple, groups of, times, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens
equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact

Key Skills

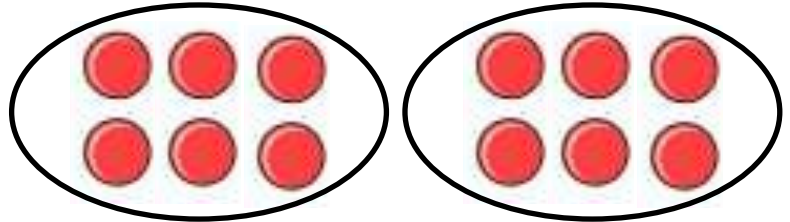
- Count in steps 2's, 3's, 5's and 10's from any number.
- Recall and use multiplication facts from the 2, 5 and 10 times table.**
- Recognise odd and even numbers.
- Write and calculate number statements using x and = signs in different orders.
- Show that multiplication can be done in any order (the commutative law).
- Solve a range of multiplication problems in using objects, arrays, repeated addition, mental methods and multiplication facts.
- Use and become familiar with all the above multiplication language.

Year 2 - Division

Grouping and sharing larger quantities using written methods and symbols. Children will continue to use methods of sharing and grouping with pictorial representations and manipulatives to support their understanding of arrays, as well as a division number line for repeated subtraction/chunking.



$$8 \div 2 = 4$$



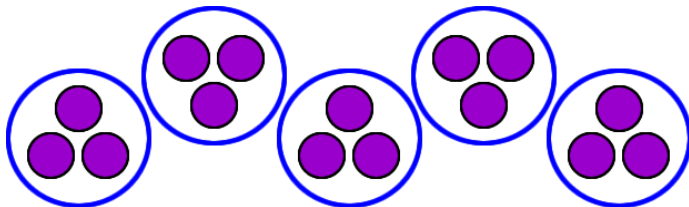
$$12 \div 2 = 6$$



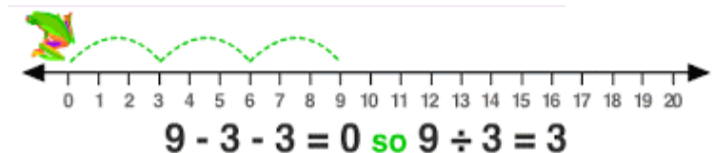
$$10 \div 2 = 5$$

40			
10	10	10	10

10	10	10	10	10	10	10



15 shared into 5 groups.



Key Vocabulary

Multiple , groups of , once, twice, three times ... ten times, repeated addition, division, dividing, divide, divided by, divided into, grouping , sharing, share, share equally, left, left over, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of ,halving, array, row, column , number patterns , multiplication table, division fact

Key Skills

- Count in steps of 2,3,5 and 10 to any number divisible by the dividend.
- Recall and use x and ÷ facts for the 2, 5, 10 times tables.
- Solve division problems and write division number sentences for problems
- Understand that division is not commutative, unlike multiplication.
- Solve increasingly challenging division problems using pictorial and manipulatives such as sharing and grouping.

Year 3 - Addition

Adding with 3 digit numbers.

Children will continue using the traditional column method, using pictorial representations and manipulatives for 3 digit numbers. They will also moving on to carrying ones and tens.

Mental partitioning

$$171 + 223 =$$

$$100 + 200 =$$

$$70 + 20 =$$

$$1 + 3 =$$

Hundreds	Tens	Ones
 1	 6	 3
+	 3	 8

800	
100	700

£8 and 99p	
£8 and 96p	

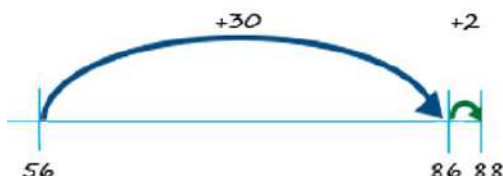
	H	T	O
	2	4	5
+		8	4
	3	2	9

Number bonds

$$4 + 6 = 10$$

$$14 + 6 = 20$$

$$40 + 60 = 100$$



Adding 1, 10, 100 more.

$$23 + 1 = 24$$

$$23 + 10 = 33$$

$$23 + 100 = 123$$

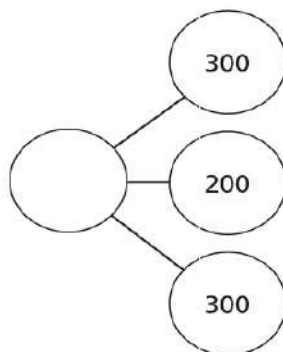
Variation

$$1 + 3 = 4$$

$$11 + 3 = 14$$

$$21 + 3 = 24$$

$$31 + 3 = 34$$



100s	10s	1s
		
		

Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, double, near double, half, halve, one more, two more ... ten more ... one hundred more How many more to make ...? How many more is ... than ...?

How much more is ...? Equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary

Key Skills

- Read and write numbers to 1,000 in numerals.
- Add 2 digit numbers mentally, including those that bridge 100.
- Add a 3 digit number and ones, a 3 digit number and 10s and a 3 digit number and 100s mentally.
- Estimate answers to calculations, using the inverse operation to check.
- Solve problems, including missing number problems using number facts and place value.
- Recognise the place value of each digit in a 3 digit number. (Hundreds, tens and ones.)
- Continue to practise many different mental strategies, including adding to the nearest multiple of 10, 100, 1000, using number bonds, using near doubles, partitioning and recombining, etc.

Year 3 - Subtraction

Subtracting with 2 and 3 digit numbers.

Children will continue using the traditional column method, using pictorial representations and manipulatives for 3 digit numbers. Also, they will consolidate their knowledge of counting both backwards and forwards using a blank number line to develop their mental strategies.

Mental partitioning

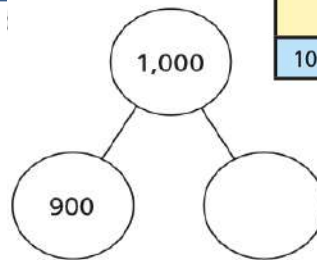
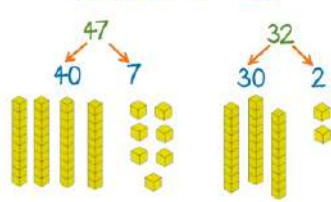
$$223 - 112 =$$

$$200 - 100 =$$

$$20 - 10 =$$

$$3 - 1 =$$

Subtract: $47 - 32$.



800	
100	700

£8 and 99p

£8 and 96p

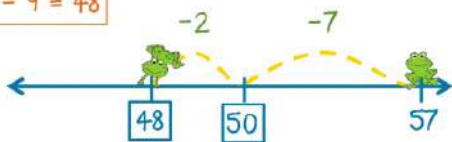
Number bonds

$$10 - 4 = 6$$

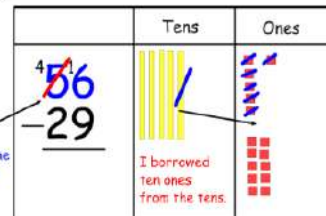
$$20 - 4 = 16$$

$$100 - 40 = 60$$

$$57 - 9 = 48$$



When subtracting, the top number is the most important.



Subtracting 1, 10, 100

$$123 - 1 = 122$$

$$123 - 10 = 113$$

$$123 - 100 = 23$$

Variation

$$130 - 3 = 127$$

$$130 - 4 = 126$$

$$130 - 5 = 125$$

$$130 - 6 = 124$$

	T	O
	45	12
-	27	
	25	



Key Vocabulary

Half, halve, How many more to make ...? How many more is ... than ...? How much more is ...? Subtract, take away, 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 less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary.

Key Skills

- Subtract mentally: a 3 digit numbers and 1's, a 3 digit number and 10's, and a 3 digit number and 100's.
- Estimate answers and use the inverse to check.
- Solve problems in different contexts, including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place value of a 3 digit number (Hundreds, tens and ones.)
- Solve 'finding the difference' problems by counting on.
- Reading and writing numbers up to 1,000 in numerals and words.
- Practise and develop mental strategies including subtracting to the nearest multiples of 10, counting on, etc.

Year 3 - Multiplication

Multiplying 2 digit numbers by 1 digit numbers.

Children will move on from arrays and start using the traditional, formal method of short multiplication, alongside developing their mental strategies. They will also learn to use bar models for problem solving and reasoning to develop their in-depth learning.

	3	1
x		3
	9	3

²	¹	
	4	2
x		5
	2	1
		0

34×3

$22 \times$

$\begin{array}{r} t \quad 0 \\ 2 \quad 2 \\ \times \quad 4 \\ \hline \end{array}$

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact.

Key Skills

- Recall and use multiplication facts for 2, 3, 4, 5, 8 and 10 times tables and multiply multiples of 10.
- Use other times table to derive facts. (For example, doubling to learn 4's and 8's.)
- Answer 2 digit x 1 digit problems using mental strategies (when appropriate) and written, formal methods.
- Solve multiplication problems in context, including missing number problems and scaling.
- Develop mental strategies and when is appropriate to use them.
- Pupils begin to derive related facts from times tables. E.g. $9 \times 3 = 27$ means $90 \times 3 = 270$ (The question is tens times bigger, so therefore so is the answer.)

Year 3 - Division

Dividing 2 digit numbers by 1 digit numbers.

Children will move on from arrays and start using the traditional, formal method of short division (without remainders), alongside developing their mental strategies. They will also learn to use bar models for problem solving and reasoning to develop their in-depth learning.

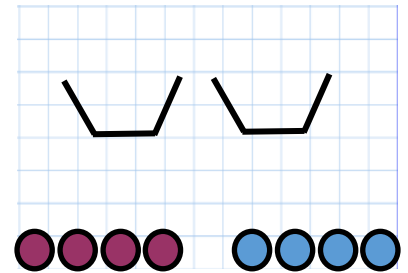
36		

	1	3
3	3	9

	0	6
7	4	⁴ 2

	1	1	
8	8	8	

$$2 \overline{)44}$$



Key Vocabulary

Multiple, factor, groups of, once, twice, three times ... ten times, repeated addition, division, dividing,, divide, divided by, divided into, grouping, sharing, share, share equally, left, left over, remainders, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, halving, array, row, column, number patterns, multiplication table, division fact

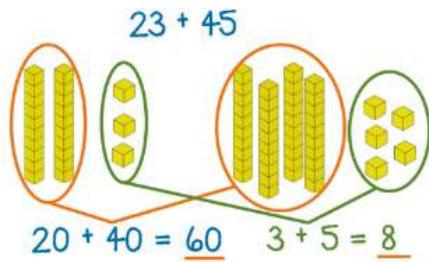
Key Skills

- Recall and use multiplication facts for 2, 3, 4, 5, 8 and 10 times tables and multiply multiples of 10.
- Use other times table to derive facts. (For example, doubling to learn 4's and 8's.)
- Answer 2 digit x 1 digit problems using mental strategies (when appropriate) and written, formal methods.
- Solve multiplication problems in context, including missing number problems and scaling.
- Develop mental strategies and when is appropriate to use them.
- Pupils begin to derive related facts from times tables. E.g. $27 \div 3 = 9$ means $270 \div 3 = 90$ (The question is tens times bigger, so therefore so is the answer.)

Year 4 - Addition

Adding with 4 digit numbers.

Children will consolidate their use of the traditional, column addition method and will be able to use it confidently to add numbers up to 4 digits. This will include carrying hundreds, tens and ones. Children will also develop their rounding skills to estimate the answers to addition questions.



Number bonds

$$4 + 6 = 10$$

$$14 + 6 = 20$$

$$40 + 60 = 100$$

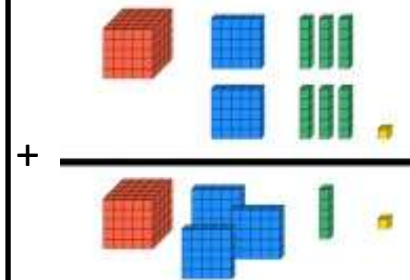
Mental partitioning

$$171 + 223 =$$

$$100 + 200 =$$

$$70 + 20 =$$

$$1 + 3 =$$



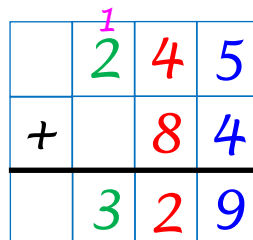
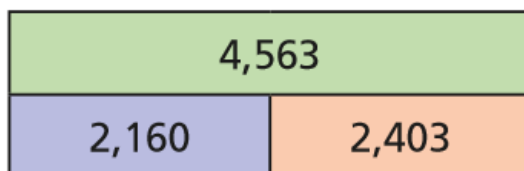
Variation

$$1 + 3 = 4$$

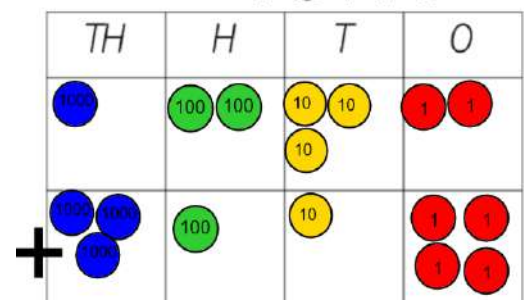
$$11 + 3 = 14$$

$$21 + 3 = 24$$

$$31 + 3 = 34$$



$$1232 + 3114$$



Adding 1, 10, 100 more.

$$23 + 1 = 24$$

$$23 + 10 = 33$$

$$23 + 100 = 123$$

Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, double, near double, half, halve, one more, two more ... ten more ... one hundred more How many more to make ...? How many more is ... than ...?

How much more is ...? Equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary

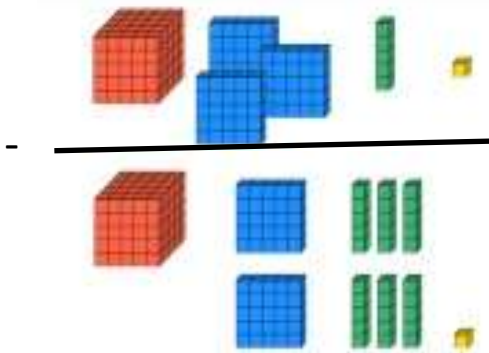
Key Skills

- Select the most appropriate method (written, formal methods or mental) and explain why this method has been chosen.
- Recognise the place value of every digit in a 4 digit number. (Thousands, hundreds, tens and ones.)
- Round any number to the nearest 10, 100 or 1,000.
- Estimate and use inverse operations to check answers.
- Solve 2 step problems in different contexts, picking the correct operation to use.
- Continue to use a wide range of mental addition strategies.
- Add numbers with up to 4 digits using column addition.
- Find 1,000 more than a given number.

Year 4 - Subtraction

Subtracting with 4 digit numbers.

Children will consolidate their use of the traditional, column subtraction method and will be able to use it confidently to subtract from numbers up to 4 digits. This will include borrowing hundreds, tens and ones. Children will also develop their rounding skills to estimate the answers to addition questions.



	7	8	3	4
-			9	2
	7	4	2	

Number bonds

$$10 - 4 = 6$$

$$20 - 4 = 16$$

$$100 - 40 = 60$$

Subtracting 1, 10, 100

$$123 - 1 = 122$$

$$123 - 10 = 113$$

$$123 - 100 = 23$$

4,563
2,160
2,403

Mental partitioning

$$223 - 112 =$$

$$200 - 100 =$$

$$20 - 10 =$$

$$3 - 1 =$$

Variation

$$130 - 3 = 127$$

$$130 - 4 = 126$$

$$130 - 5 = 125$$

$$130 - 6 = 124$$

TH	H	T	O
● ●	● ●	● ● ●	● ●

TH	H	T	O
●	●	●	●

$$\begin{array}{r} 2232 \\ - 1121 \\ \hline \end{array}$$

Key Vocabulary

Half, halve, How many more to make ...? How many more is ... than ...? How much more is ...? Subtract, take away, 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 less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary.

Key Skills

- Select the most appropriate method (written, formal methods or mental) and explain why this method has been chosen.
- Recognise the place value of every digit in a 4 digit number. (Thousands, hundreds, tens and ones.)
- Round any number to the nearest 10, 100 or 1,000.
- Estimate and use inverse operations to check answers.
- Solve 2 step problems in different contexts, picking the correct operation to use.
- Continue to use a wide range of mental subtraction strategies.
- Subtract by counting on where a numbers are crossing a multiple of 10, 100, etc.
- Find 1,000 less than a given number.

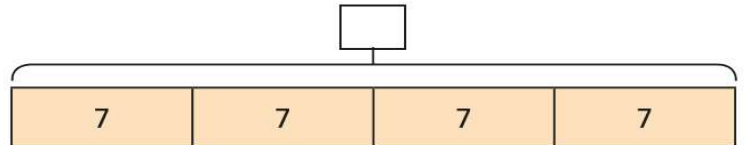
Year 4 - Multiplication

Multiplying 2 and 3 digit numbers by 1 digit

Children will consolidate their use of the traditional, formal method of short multiplication (with remainders), alongside developing their mental strategies. They will also continue to use bar models for problem solving and reasoning to develop their in-depth learning.

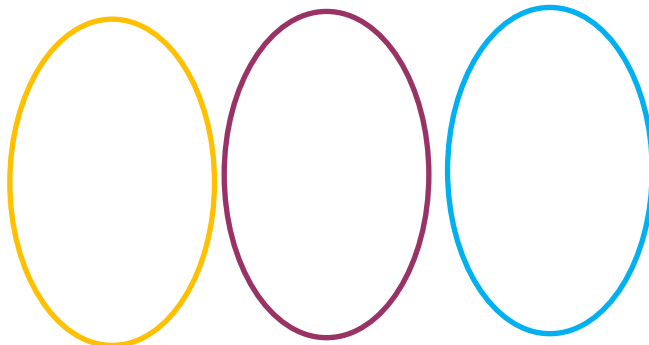
②	①	
	4	2
×		5
2	1	0

①	②	①	
	2	4	3
×			6
1	4	5	8



$$\begin{array}{r} 322 \\ \times 4 \\ \hline \end{array} = \square$$

Below the equation, there are three colored boxes (yellow, purple, blue) with arrows pointing to the hundreds, tens, and ones digits of 322 respectively.



	h	t	o
	3	2	2
×			4

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact, inverse, square, squared, cube, cubed.

Key Skills

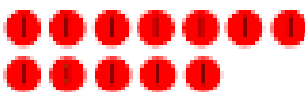
- Count in multiples of 6, 7, 9, 25 and 1,000.
- Recall multiplication facts for all multiplication tables up to 12 x 12.**
- Recognise the place value of every digit in a 4 digit number. (Thousands, hundreds, tens and ones.)
- Multiply larger numbers mentally, using place value, known facts and derived facts.
- Solve problems that include multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects..

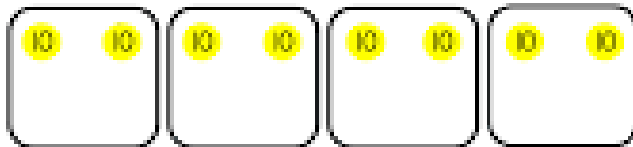
Year 4 - Division

Dividing 2 digit numbers by 1 digit numbers with remainders.

Children will consolidate their use of the traditional, formal method of short division (with remainders), alongside developing their mental strategies. They will also continue to use bar models for problem solving and reasoning to develop their in-depth learning.

$$92 \div 4$$

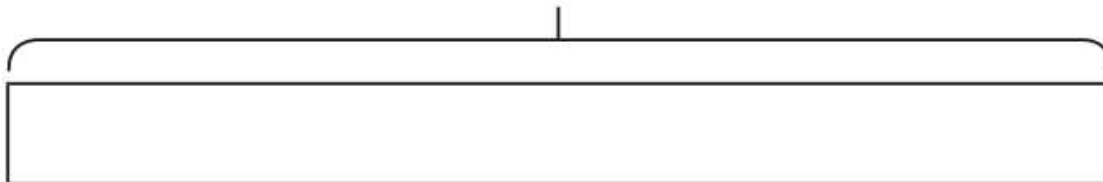
$$\begin{array}{r} 2 \\ 4 \overline{) 92} \end{array}$$




	0	6
7	4	2

	1	1	r 1
8	8	9	

56



Key Vocabulary

Multiple, factor, groups of, once, twice, three times ... ten times, repeated addition, division, dividing,, divide, divided by, divided into, grouping, sharing, share, share equally, left, left over, remainders, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, halving, array, row, column, number patterns, multiplication table, division fact, inverse, square, squared, cube, cubed.

Key Skills

- Count in multiples of 6, 7, 9, 25 and 1,000.
- Recall multiplication facts for all multiplication tables up to 12 x 12.
- Recognise the place value of every digit in a 4 digit number. (Thousands, hundreds, tens and ones.)
- Pupils begin to derive related facts from times tables. E.g. $27 \div 3 = 9$ means $270 \div 3 = 90$ (The question is tens times bigger, therefore so is the answer.)
- Solve problems that include multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects..

Year 5 - Addition

Adding with more than 4 digits and decimal numbers.

Children will consolidate their use of the traditional, column addition method with more than 4 digits and will be move on to adding decimal numbers, including in context of money and measures. It is important that children have place value skills beyond 4 digits and fully understand what each digit in a decimal number represents.

	2	4	5	.	3
+		8	4	.	5
	3	2	9	.	8

	2	4	5
+		8	4
	3	2	9

50,000	470
--------	-----

Ones	Tenths	Hundredths
1 1 1	0.1 0.1 0.1	0.001 0.001 0.001 0.001

Number bonds

$4 + 6 = 10$
 $40 + 60 = 100$
 $400 + 600 = 1,000$
 $4,000 + 6,000 = 10,000$
 $40,000 + 60,000 = 100,000$

Adding 1, 10, 100, 1000, 10,000, 100,000 more.

$23 + 1 = 24$
 $23 + 10 = 33$
 $23 + 100 = 123$
 $23 + 1,000 = 1023$
 $23 + 10,00 = 10,023$
 $23 + 100,000 = 100,023$

Variation

$1 + 3 = 4$
 $11 + 3 = 14$
 $21 + 3 = 24$
 $31 + 3 = 34$

Mental partitioning

$171 + 223 =$
 $100 + 200 =$
 $70 + 20 =$
 $1 + 3 =$

Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, double, near double, half, halve, one more, two more ... ten more ... one hundred more How many more to make ...? How many more is ... than ...?

How much more is ...? Equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary, ones boundary, tenths boundary.

Key Skills

- Select the most appropriate method (written, formal methods or mental) and explain why this method has been chosen.
- Recognise the place value of every digit in numbers to 1,000,000.
- Use rounding to check answers and estimate.
- Understand the place value of tenths and hundredths.
- Solve multi-step problems in different contexts, picking the correct operations to use and explaining why they have been chosen.
- Continue to use a wide range of mental addition strategies.
- Round any number from 1,000,000 to the nearest 10, 100, 1,000, 10,000 or 100,000.

Year 5 - Subtraction

Subtracting with numbers beyond 4 digits, including decimals, Children will consolidate their use of the traditional, column subtraction method and will be able to use it confidently. They will start to subtract larger integers and begin to subtract decimal amounts whilst also developing their mental strategies.

	¹ 2	¹ 2	5	.	7
-		8	4	.	5
	1	4	1	.	2

	⁷ 8	¹ 3	4
-		9	2
	7	4	2

20,000		
3,729		8,451

Number bonds

$10 - 4 = 6$
 $20 - 4 = 16$
 $100 - 40 = 60$
 $1,000 - 400 = 600$
 $10,000 - 4,000 = 6,000$
 $100,000 - 40,000 = 60,000$

Mental partitioning

$223 - 112 =$
 $200 - 100 =$
 $20 - 10 =$
 $3 - 1 =$

Subtracting 1, 10, 100, 1000

$1,123 - 1 = 1,122$
 $1,123 - 10 = 1,113$
 $1,123 - 100 = 1,023$
 $1,123 - 1,000 = 123$

Variation

$130 - 3 = 127$
 $130 - 4 = 126$
 $130 - 5 = 125$
 $130 - 6 = 124$

1s		$\frac{1}{10}$ s	$\frac{1}{100}$ s	$\frac{1}{1000}$ s	
○○○	●	○○○○	○○○○	○○○○	3.576
				○	-1.245
					2.331

Key Vocabulary

Half, halve, How many more to make ...? How many more is ... than ...? How much more is ...? Subtract, take away, 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 less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary, ones boundary, tenths boundary.

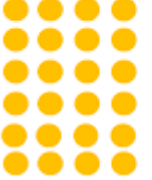
Key Skills

- Select the most appropriate method (written, formal methods or mental) and explain why this method has been chosen.
- Recognise the place value of every digit in numbers to 1,000,000.
- Round any number from 1,000,000 to the nearest 10, 100, 1,000, 10,000 or 100,000.
- Use rounding to check answers and estimate.
- Solve 2 step problems in different contexts, picking the correct operation to use.
- Continue to use a wide range of mental subtraction strategies with increasingly larger numbers.
- Count forwards and backwards in steps of powers of 10, up to 1,000,000.
- Understand negative numbers, in context, and count forwards and backwards through 0.

Year 5 - Multiplication

Multiplying up to 4 digits by 1 or 2 digits.

Children will continue to use short multiplication to solve increasingly richer problems that involve multiplying by 1 digit, before moving on to long multiplication. They will then move onto making estimations to check their answers are correct.

	40	2
40		
6		

	②	①	
	4	2	
X		5	
	2	1	0

	①	②	①	
	2	4	3	
X			6	
	1	4	5	8

		①	②	③	
		1	2	3	4
	X			1	6
		7	4	0	4
+	1	2	3	4	0
	1	9	4	4	4

120	120	120	120
c	c	c	c

$$\begin{array}{c} 322 \times 4 = \square \\ \swarrow \quad \downarrow \quad \searrow \\ \square \quad \square \quad \square \end{array}$$

	6	.		
6	0	.		

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, prime numbers, prime factors and composite numbers.

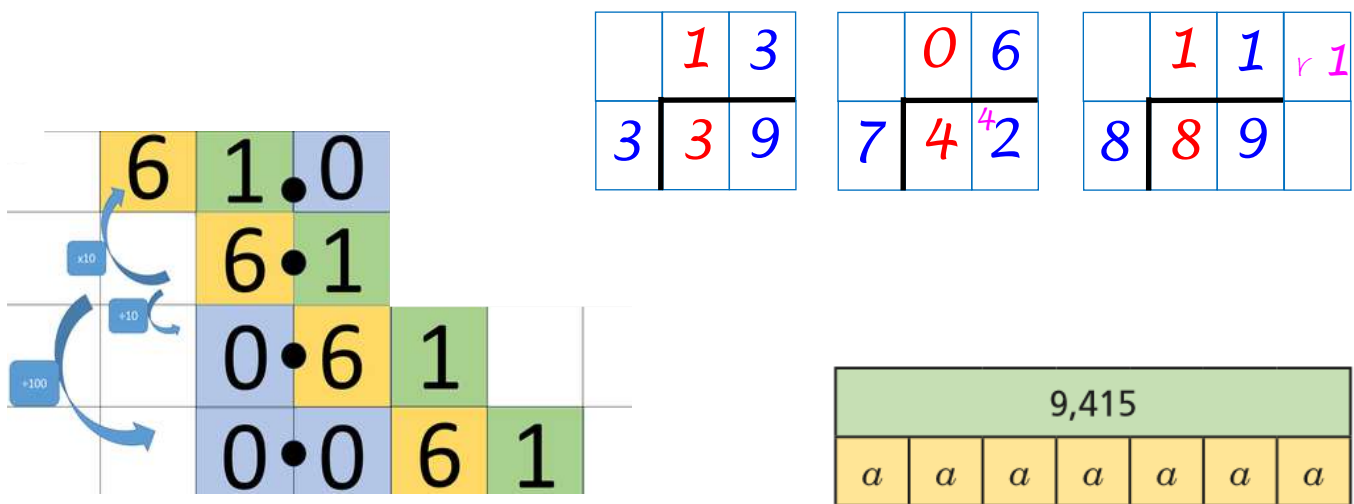
Key Skills

- **Multiply and divide numbers mentally, using known facts.**
- Identify multiples and factors.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 100.
- Recognise and use square and cube numbers and their notations.
- Solve problems with a combination of all four operations including fraction scaling problems and problems involving simple rates.

Year 5 - Division

Extending the use of short division to 4 digits and remainders.

Children will consolidate their use of the traditional, formal method of short division (with remainders), alongside developing their mental strategies. They will also continue to use bar models for problem solving and reasoning to develop their in-depth learning.



Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, prime numbers, prime factors and composite numbers

Key Skills

- Multiply and divide numbers mentally, using known facts.
- Identify multiples and factors.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Use vocabulary of prime numbers, prime factors and composite numbers.
- Work out whether numbers up to 100 are prime numbers, and learn all the prime numbers up to 30.
- Present division remainders in different contexts, for example fractions, decimals or whole numbers using rounding.
- Solve problems with a combination of all four operations including fraction scaling problems and problems involving simple rates.

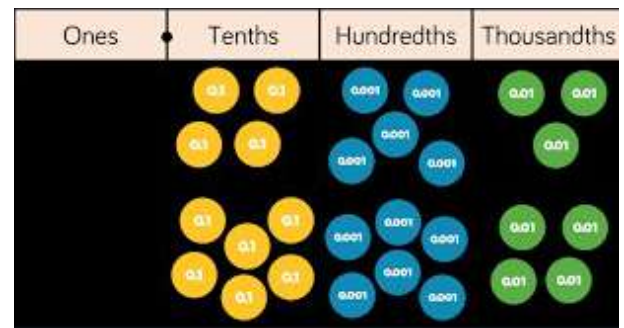
Year 6 - Addition

Adding several numbers with an increasing level of complexity. Children will consolidate their use of the traditional, column subtraction method with increasingly complex range of calculations. These will include using decimals (including in the context of money or measure) and mixed numbers, with both formal and mental calculations.

	2	4	5	.	3
+		8	4	.	5
	3	2	9	.	8

	2	4	5
+		8	4
	3	2	9

?		
2,354	750	1,500



Number bonds

$4 + 6 = 10$
 $40 + 60 = 100$
 $400 + 600 = 1,000$
 $4,000 + 6,000 = 10,000$
 $40,000 + 60,000 = 100,000$

Adding 1, 10, 100, 1000, 10,000, 100,000 more.

$23 + 1 = 24$
 $23 + 10 = 33$
 $23 + 100 = 123$
 $23 + 1,000 = 1023$
 $23 + 10,00 = 10,023$
 $23 + 100,000 = 100,023$

Variation

$1 + 3 = 4$
 $11 + 3 = 14$
 $21 + 3 = 24$
 $31 + 3 = 34$

Mental partitioning

$171 + 223 =$
 $100 + 200 =$
 $70 + 20 =$
 $1 + 3 =$

Key Vocabulary

Addition, add, more, and, make, sum, total, altogether, double, near double, half, halve, one more, two more ... ten more ... one hundred more How many more to make ...? How many more is ... than ...?

How much more is ...? Equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary, ones boundary, tenths boundary.

Key Skills

- Solve problems mentally, including those with mixed operations and large numbers, using all the mental strategies learnt in previous years.
- Solve multi-step problems in context, deciding which operations and methods to use.
- Use estimation to check answers to a calculation.
- Understand the place value of digits up to 10,000,000.
- Round any whole number to the nearest 10, 100, 1,000, 10,000, 100,000, 1,000,000 and 10,000,000.
- Round decimal decimals to the nearest whole number.
- Use negative numbers in context and calculate intervals across 0.

Year 6 - Subtraction

Subtracting with increasingly complex numbers including decimals,

Children will consolidate their use of the traditional, column subtraction method with increasingly complex range of calculations. These will include using decimals and mixed numbers, with both formal and mental calculations.

	⁷ 8	¹ 3	4
-		9	2
	7	4	2

	¹ 2	¹ 2	5	.	7
-		8	4	.	5
	1	4	1	.	2

20,000		
3,729		8,451

Number bonds

$10 - 4 = 6$
 $20 - 4 = 16$
 $100 - 40 = 60$
 $1,000 - 400 = 600$
 $10,000 - 4,000 = 6,000$
 $100,000 - 40,000 = 60,000$

Mental partitioning

$223 - 112 =$
 $200 - 100 =$
 $20 - 10 =$
 $3 - 1 =$

Subtracting 1, 10, 100, 1000

$1,123 - 1 = 1,122$
 $1,123 - 10 = 1,113$
 $1,123 - 100 = 1,023$
 $1,123 - 1,000 = 123$

Variation

$130 - 3 = 127$
 $130 - 4 = 126$
 $130 - 5 = 125$
 $130 - 6 = 124$

1s		$\frac{1}{10}$ s	$\frac{1}{100}$ s	$\frac{1}{1000}$ s	
○○○	●	○○○○	○○○○	○○○○	3.576
			○○	○	-1.245
					2.331

Key Vocabulary

Half, halve, How many more to make ...? How many more is ... than ...? How much more is ...? Subtract, take away, 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 less is ...? Difference between, equals, is the same as, number bonds/pairs/facts, missing number, tens boundary, hundreds boundary, ones boundary, tenths boundary.

Key Skills

- Solve problems mentally, including those with mixed operations and large numbers, using all the mental strategies learnt in previous years.
- Solve multi-step problems in context, deciding which operations and methods to use.
- Use estimation to check answers to a calculation.
- Understand the place value of digits up to 10,000,000.
- Round any whole number to the nearest 10, 100, 1,000, 10,000, 100,000, 1,000,000 and 10,000,000.
- Round decimal numbers to the nearest whole number.
- Use negative numbers in context and calculate intervals across 0.

Year 6 - Multiplication

Consolidating short and long multiplication, multiplying decimals by 1 digit.

Children will continue to use short multiplication to solve increasingly richer problems that involve multiplying by 1 digit, before moving on to long multiplication. They will then move onto making estimations to check their answers are correct.

	40	2
40		
6		

	②	①	
	4	2	
X		5	
	2	1	0

	①	②	①	
	2	4	3	
X			6	
	1	4	5	8

		①	②	③	
		1	2	3	4
X				1	6
		7	4	0	4
+	1	2	3	4	0
	1	9	4	4	4

			425		
85	85	85	85	85	

$$\begin{array}{r} 322 \times 4 = \square \\ \square \quad \square \quad \square \end{array}$$

$13.33 \div 10$

	6	.		
6	0	.		

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, prime numbers, prime factors and composite numbers.

Key Skills

- Multiply up to 4 digits by 2 digits using long multiplication.
- Solve mixed operations and large number problems using mental maths.
- Solve multi-step problems involving a range of operations.
- Estimate and approximate answers of problems to improve accuracy.
- Round any integer to the determined level of accuracy..

Year 6 - Division

Using short division to divide 4 digit numbers and long division for dividing 2 digit numbers.

Children will consolidate their use of the traditional, formal method of short division (with remainders), alongside developing their mental strategies. This will lead to learning long division, which will be used to divide numbers by 2 digits.

Long division using place value counters
2544 ÷ 12

1000s	100s	10s	1s
2	5	4	4

We can't group 2 thousands into groups of 12 so will exchange them.

1000s	100s	10s	1s
	24	4	4

We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 0.2 \\ 12 \overline{) 2544} \\ \underline{24} \\ 1 \end{array}$$

	0	6
7	4	2

	1	1	r 1
8	8	9	

					12
		0	3	4	21
2	1	6	7	12	6
		6	3		
		0	9	6	
			8	4	
			1	2	

	6	1	0	
	6	1		
	0	6	1	
	0	0	6	1

Diagram illustrating the multiplication of 610 by 100 using a grid. The grid shows the digits of the product (6100) and the multiplier (100) aligned for multiplication. Blue arrows indicate the multiplication steps: $\times 10$ and $\times 100$.

9,180				
a	a	a	a	a
b	b	b		
c	c			

Key Vocabulary

Multiplication, multiply, multiplied by, multiple, factor, groups of, times, product, once, twice, three times ... ten times, repeated addition, grouping, one each, two each, three each ... ten each, group in pairs, threes ... tens, equal groups of, doubling, array, row, column, number patterns, multiplication table, multiplication fact, inverse, square, squared, cube, cubed, prime numbers, prime factors and composite numbers

Key Skills

- Use multiplication and division facts up to 12 x 12 to solve more complex problems.
- Decide whether to use short or long division and interpret remainders in a way that is appropriate to the problem.
- Solve mixed operations and large number problems using mental maths.
- Solve multi-step problems involving a range of operations.
- Estimate and approximate answers of problems to improve accuracy.
- Round any integer to the determined level of accuracy..
- Identify common factors, commons multiples and prime numbers.
- Use written methods of division to solve decimal problems up to 2 decimal places.