Airedale Infant School

Calculation Policy

Version	Date
Last reviewed	July 2022
Next reviewed	July 2023
Owner	Maths Leader – L Clarkson
Approver	Academy Council

Adopting a common calculation policy within our pyramid ensures that children will be taught in the same way in both key stage one and two, thus developing their understanding of the subject as they move up through school, transition between key stages and onto to key stage three. Consequently, teaching time will be spent in promoting mathematical procedures that are flexible, accurate, consistent, efficient and appropriate methods of calculation in all key stages using the same methods.

Within the pyramid, it is essential to be consistent in our approach to different calculation methods; using a common calculation policy is the means by which we will strive to address this.

Although the main focus of this policy is on effective written compact methods, it is important to recognise that the ability to calculate mentally lies at the heart of mathematics. Mental calculations are not at the exclusion of written recordings and should be seen as complementary to, and not as separate from it. In every written method, there is an element of mental processing. Written recordings both help children to clarify their thinking and support and extend the development of more fluent and sophisticated mental strategies.

Key Elements

Discussion will play a key part in maths lessons, Children will be encouraged to talk about the processes they have used to reach their answers. Teachers will encourage and promote the use of correct mathematical vocabulary.

Children will be taught to partition in different ways, use number bonds and times table facts wherever possible to aid calculations. Children will be encouraged to show their working out, and will be taught how to record their work methodically.

As children move up through school, the calculation methods will show progression and the numbers used will be more age/stage appropriate.

Children should be encouraged to check their work by estimation to see if their answer is reasonable and sensible as well as perform the inverse relationship to check for answer accuracy.

Where possible, mathematics will be used in other curriculum areas to enrich the curriculum and develop cross-curricular links.

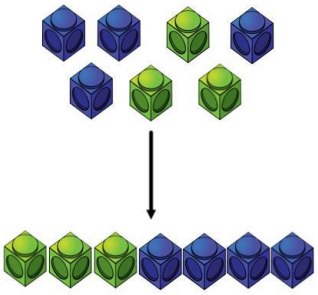
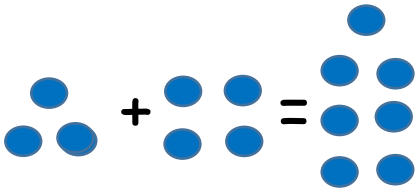
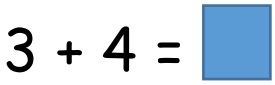
Addition

EYFS Objectives

- Using quantities and objects, they add two single-digit numbers and count on or back to find the answer.

Vocabulary

add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…, how many more to make… ?, how many more is… than…?

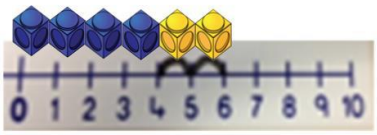
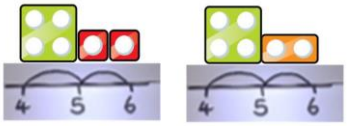
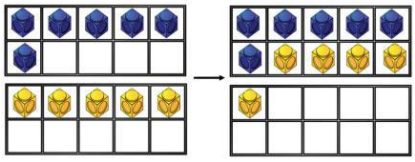
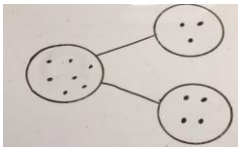
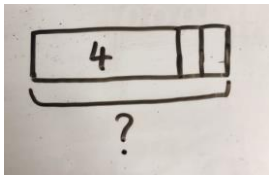
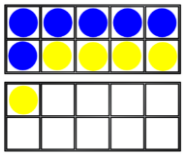
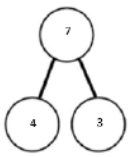
Concrete	Pictorial	Abstract
Use resources e.g. cars, dinosaurs, shells, bears 	Draw objects 	Write numbers onto a part whole model 

Year 1 Objectives

- To read, write and interpret mathematical statements involving addition (+)
- To add one-digit and two-digit numbers to 20, including zero
- To solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems

Vocabulary

number bonds, add, more, plus, make, sum, total, altogether, inverse double, near double, equals, is the same as (including equals sign), score, one more, two more… ten more, how many more to make…?, how many more is… than…?, how much more is…?

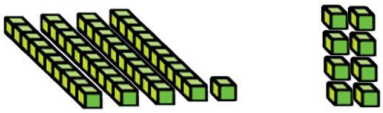
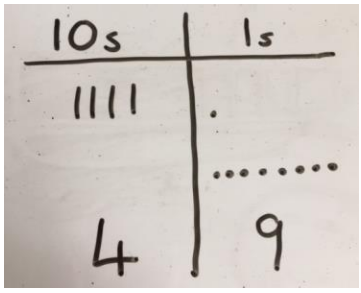
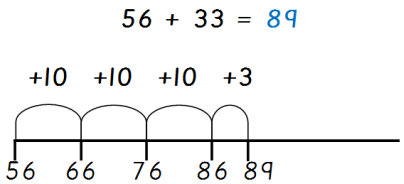
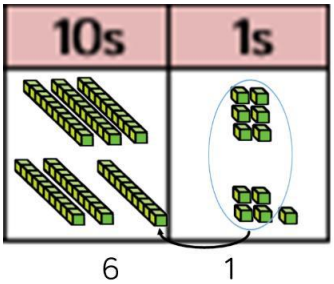
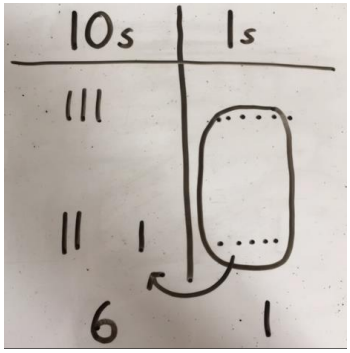
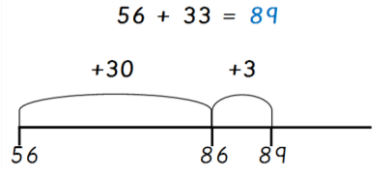
Concrete	Pictorial	Abstract
Counting on using a number line and practical resources   Use 10 Frames 	Draw objects onto a part whole model  Use bar model  Use a 10 Frame 	Write numbers onto a part whole model  Use Number Lines Written Method 6 + □ = 11 6 + 5 = 5 + □ 6 + 5 = □ + 4

Year 2 Objectives

- To add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers and adding three one-digit numbers
- To solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- To show that addition of two numbers can be done in any order
- To recognise and use the inverse relationship and use this to check calculations and solve missing number problems.

Vocabulary

add, addition, more, plus, make, sum, total, altogether, score, double, near double, one more, two more… ten more… one hundred more, how many more to make…?, how many more is… than…?, how much more is…?, tens boundary

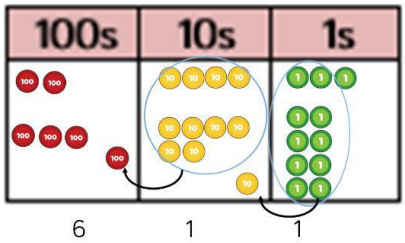
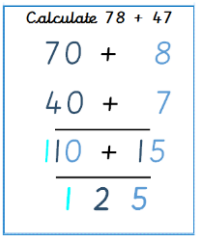
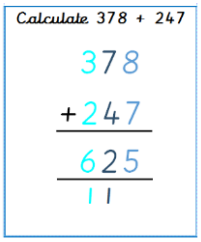
Concrete	Pictorial	Abstract
Base 10 	Place Value Chart/Whiteboard 	Number Line Counting on in tens and ones 
Base 10 and Partitioning 	Place Value Chart/Whiteboard including carrying 	Number Line Adding the tens and then units 
		Partition Method Calculate 52 + 6 50 + 2 0 + 6 50 + 8 5 8

Year 3 Objectives

- To add numbers with up to three digits, using formal written methods of columnar addition
- To estimate the answer to a calculation and use inverse operations to check answers
- To solve problems, including missing number problems, using number facts, place value, and more complex addition

Vocabulary

add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more… one hundred more, how many more to make …? how many more is… than …? how much more is…?, tens boundary, hundreds boundary

Concrete	Abstract
Place Value Counters  	Partitioning Column Method  Concrete Column Method 

Year 4 Objectives

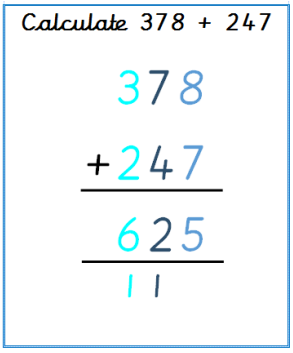
- To add numbers with up to 4 digits using the formal written methods of columnar addition
- To estimate and use inverse operations to check answers to a calculation
- To solve addition two-step problems in contexts, deciding which operations and methods to use and why.

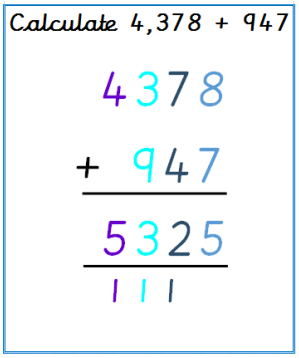
Vocabulary

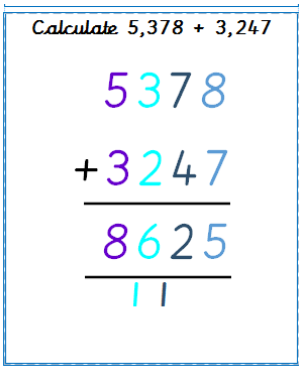
add, addition, more, plus, increase, sum, total, altogether, score, double, near double , tens boundary, hundreds boundary, thousands boundary, inverse

Abstract

Formal Written method (carrying can be above or below the equal sign)







Year 5 Objectives

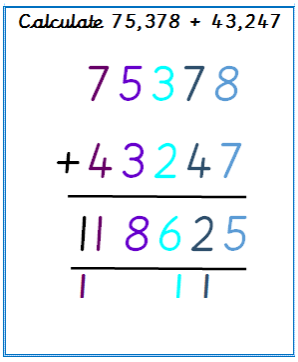
- To add whole numbers with more than 4 digits, including using formal written methods
- To use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- To solve addition multi-step problems in contexts, deciding which operations and methods to use and why.

Vocabulary

Efficient written method, add, addition, more, plus, increase, sum, total, altogether, score, tens boundary, hundreds boundary, thousands boundary, units boundary, tenths boundary, inverse

Abstract

Formal Written method (carrying can be above or below the equal sign)



Year 6 Objectives

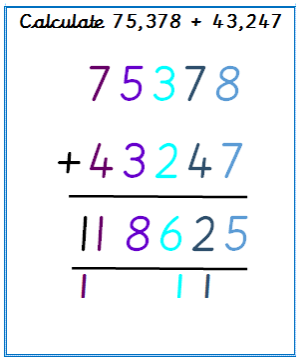
- To solve addition multi-step problems in contexts, deciding which operations and methods to use and why
- To use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Vocabulary

order of operations, column addition, add, in total, answer, tens boundary, hundreds boundary, thousands boundary, millions boundary, units boundary, tenths boundary, hundredths boundary, decimal place, inverse

Abstract

Formal Written method (carrying can be above or below the equal sign)



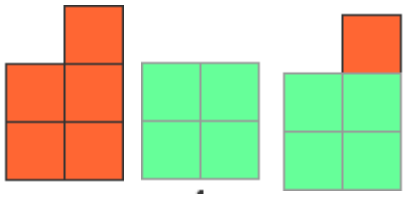
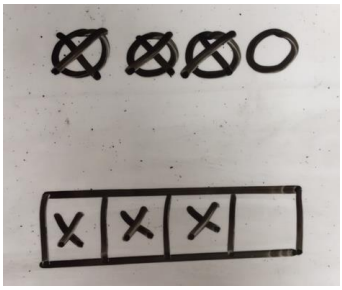
Subtraction

EYFS Objectives

- Using quantities and objects, they subtract two single-digit numbers and count on or back to find the answer.

Vocabulary

take (away), leave, how many are left/left over?, how many have gone?, one less, two less… ten less…,how many fewer is… than…?, difference between, is the same as

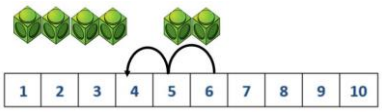
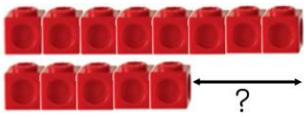
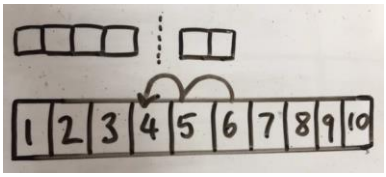
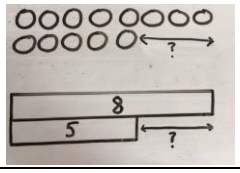
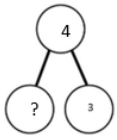
Concrete	Pictorial	Abstract
Use resources e.g. ten frames, Numicon, cubes, bean bags Find the difference using cubes, Numicon, Cuisenaire robs 	Draw objects they are using and then cross out the correct amount. 4 – 3 = 1 	Write numbers onto a part whole model 4 – 3 = ☐

Year 1 Objectives

- To read, write and interpret mathematical statements involving subtraction (-)
- To subtract one-digit and two-digit numbers to 20, including zero
- To solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems

Vocabulary

subtract, take away, minus, leave, how many fewer is…than..?, how much less is..? half, halve, how many are left/left over?, how many are gone?, one less, two less, ten less…, how many fewer is… than…?, how much less is…? =, equals, sign, is the same as, count on, count back, difference between. how many more is…than..?, how much more is..?

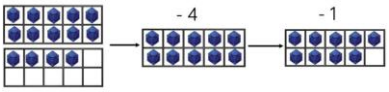
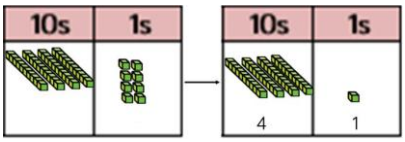
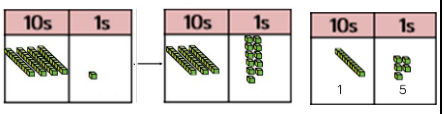
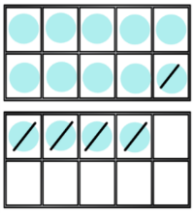
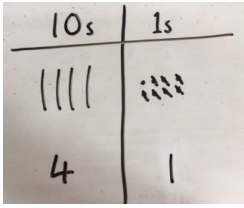
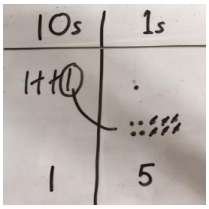
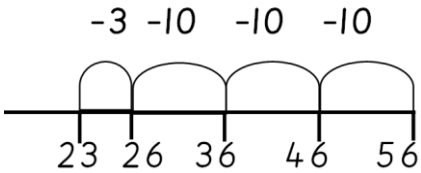
Concrete	Pictorial	Abstract
Counting back using a number line and practical resources  Find the difference using cubes, Numicon, Cuisenaire robs 	Use pictorial methods  Draw the objects or use bar modelling 	Write numbers onto a part whole model  Use Number Lines Written Method 8 – 5, the difference is ☐

Year 2 Objectives

- To subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers
- To solve problems with subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- To show that addition of two numbers can be done in any order and subtraction of one number from another cannot
- To recognise and use the inverse relationship and use this to check calculations and solve missing number problems.

Vocabulary

subtract, minus, leave, how many are left/left over?, how many less is… than…?, how much fewer is…?, difference between, half, halve, equals, sign, is the same as, partition, inverse, count on , count back, one less, ten less… one hundred less.

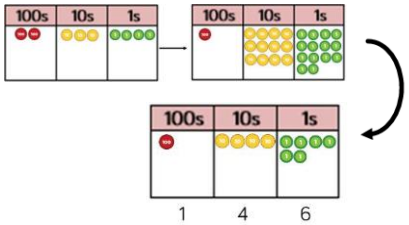
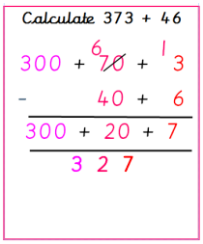
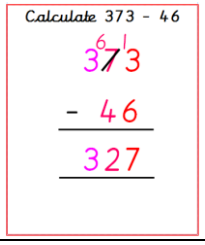
Concrete	Pictorial	Abstract
Use a 10 Frame  Base 10  Base 10 and exchange  	Use a 10 Frame  Place Value Chart/Whiteboard  Place Value Chart/Whiteboard including exchange  	Number Line Counting back in tens and ones 56 - 33 = 23  Partition Method Calculate 26 - 3 20 + 6 - + 3 20 + 3 23

Year 3 Objectives

- To subtract numbers with up to three digits, using formal written methods of columnar subtract
- To estimate the answer to a calculation and use inverse operations to check answers
- To solve problems, including missing number problems, using number facts, place value, and more complex subtractions

Vocabulary

leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is… than…?, how much more/less is…?, Is the same as, equals, sign. multiples of tens and hundreds.

Concrete	Abstract
Place Value Counters 	Partitioning Column Method  Concrete Column Method 

Year 4 Objectives

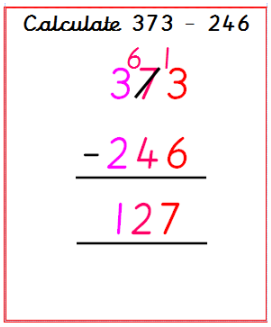
- To subtract numbers with up to 4 digits using the formal written methods of columnar subtraction
- To estimate and use inverse operations to check answers to a calculation
- To solve subtraction two-step problems in contexts, deciding which operations and methods to use and why.

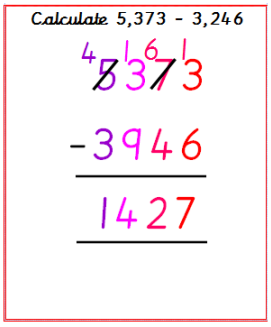
Vocabulary

subtract, subtraction, minus, *decrease*, leave, how many are left/left over?, difference between, how many more/fewer is… than…?, how much more/less is…?, Is the same as, equals, sign. Column subtraction, decomposition, exchange, multiples of thousand, inverse.

Abstract

Formal Written Method





Year 5 Objectives

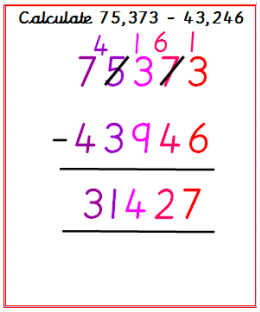
- To subtract whole numbers with more than 4 digits, including using formal written methods
- To use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- To solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Vocabulary

efficient written method, subtract, subtraction, minus, decrease, difference between, inverse, decimals, units and tenths boundary, column subtraction, decomposition, exchange.

Abstract

Formal Written Method



Year 6 Objectives

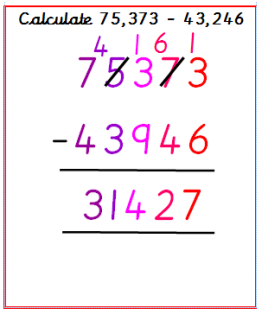
- To solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- To use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Vocabulary

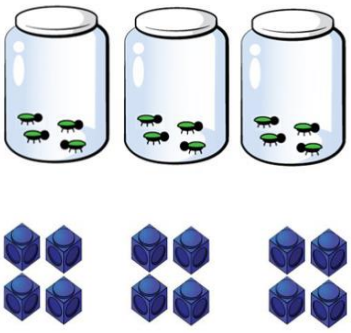
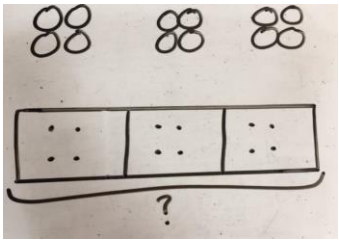
order of operations, subtract, decrease, difference, inverse, decimals, units , tenths and hundredths boundary, column subtraction, decomposition, exchange.

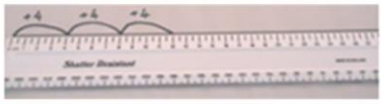
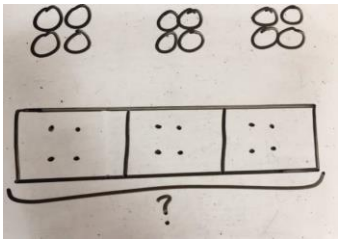
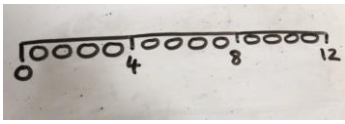
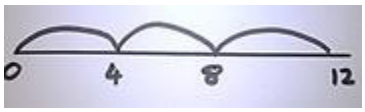
Abstract

Formal Written Method



Multiplication

EYFS Objectives • Using quantities and objects to solve problems, including doubling		
Vocabulary group, lots of, double		
Concrete	**Pictorial**	**Abstract**
Repeated grouping/repeated addition 	Use pictorial methods 	Write numbers 4 + 4 + 4 = 12

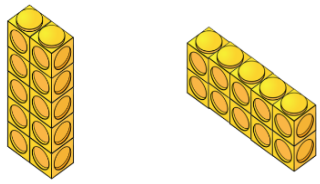
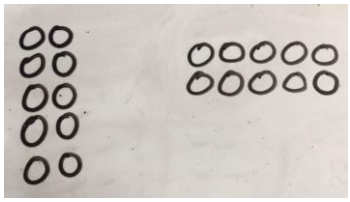
Year 1 Objectives • To solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.		
Vocabulary odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? lots of, groups of, once, twice, five times, ten times , multiple of, times, multiply, multiply by, array, row, column, double.		
Concrete	**Pictorial**	**Abstract**
Use Number Lines and/or Cuisenaire rods to show repeated addition 	Use pictorial method  	Use Number Lines 

Year 2 Objectives

- To recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- To calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs
- To show that multiplication of two numbers can be done in any order (commutative)
- To solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts.

Vocabulary

odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double.

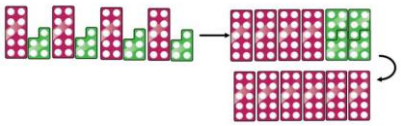
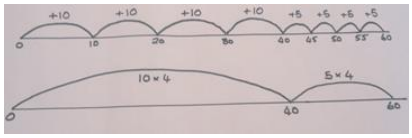
Concrete	Pictorial	Abstract
Use arrays to illustrate  2 lots of 5 5 lots of 2	Pictorial arrays 	Use arrays to write calculations 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5

Year 3 Objectives

- To recall and use multiplication facts for the 3, 4 and 8 multiplication tables
- To write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- To solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Vocabulary

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

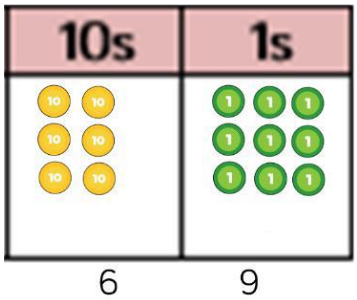
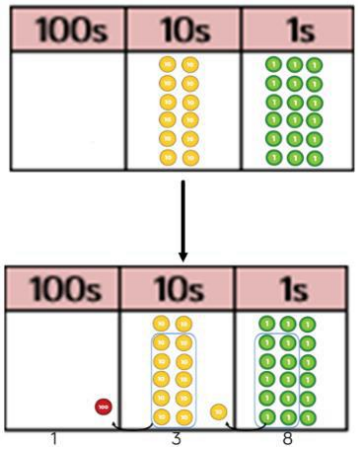
Concrete	Pictorial	Abstract
Partition to Multiply 	Arrays 4 x 6 = 24 6 x 4 = 24	Use Number Line  Partition and/or Grid Method 20 x 5 = 100 3 x 5 = 15 115 Calculate 23 X 5 X | 5 20 | 100 3 | 15 + | 115

Year 4 Objectives

- To recall multiplication facts for multiplication tables up to 12 × 12
- To use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers
- To multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- To solve problems involving 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.

Vocabulary

multiply, multiplied by, product, short multiplication, partition, distributive law, commutative, groups of, multiply, times, multiples, inverse.

Concrete	Abstract
Formal Column Method   	Compact Written Method (carrying can be above or below the equal sign) Calculate 23 X 3 23 X 3 69 Calculate 23 X 6 23 X 6 138 11

Year 5 Objectives

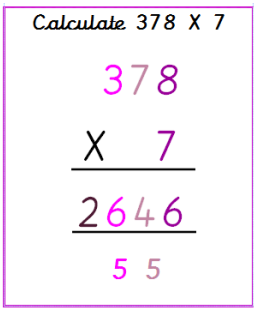
- To multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- To multiply numbers mentally drawing upon known facts
- To multiply whole numbers and those involving decimals by 10, 100 and 1000
- To solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- To solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

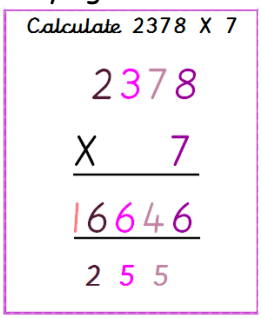
Vocabulary

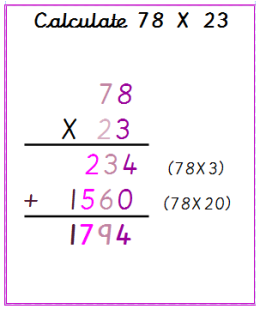
composite numbers, prime number, prime factor, cube number, square number, derive, factor pairs, formal written method, times, multiply, multiplied by, multiple of, product, short multiplication, partition, long multiplication, scaling, decimal place, units, tenths and hundreds.

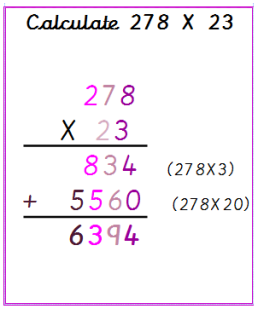
Abstract

Formal Written Method (carrying can be above or below the equal sign)









Year 6 Objectives

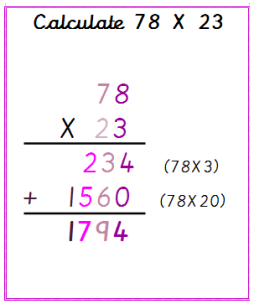
- To multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- To use their knowledge of the order of operations to carry out calculations involving the four operations
- To solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- To solve problems involving addition, subtraction, multiplication and division
- To use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

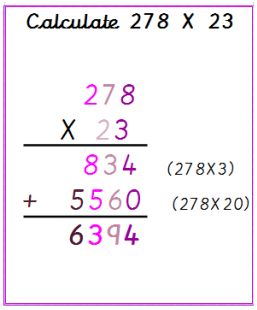
Vocabulary

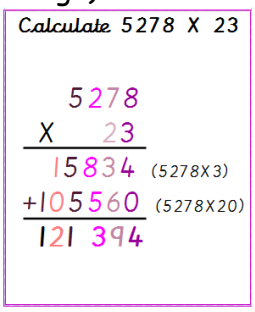
common factors, multiples, prime, formal written method, multiply, multiplied by, multiple of, product, short and long multiplication, partition, scaling, decimal place, units, tenths and hundredths.

Abstract

Formal Written Method (carrying can be above or below the equal sign)







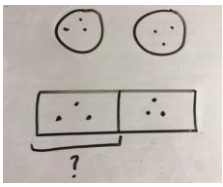
Division

EYFS Objectives

- Using quantities and objects to solve problems, including halving and sharing.

Vocabulary

halve, half, share, share equally, groups

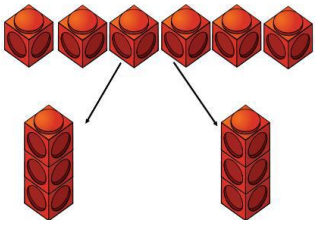
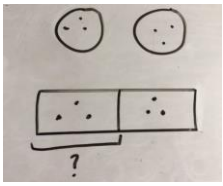
Concrete	Pictorial	Abstract
Use resources	Sharing pictorially 	Write numbers 6 shared by 2 = 3 3 | 3

Year 1 Objectives

- To solve one-step problems involving division, by calculating the answer using concrete objects and pictorial representations with the support of the teacher.

Vocabulary

halve, share, share equally, groups, equal groups of, divide, divided by, left, left over

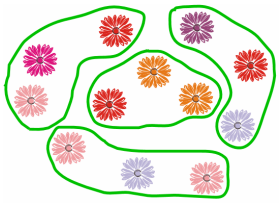
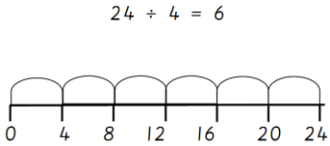
Concrete	Pictorial	Abstract
Use resources 	Sharing pictorially 	Write numbers 6 shared by 2 = 3 3 | 3

Year 2 Objectives

- To recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- To calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs
- To show division of one number by another cannot
- To solve problems involving division, using materials, mental methods, and division facts, including problems in contexts.

Vocabulary

groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse.

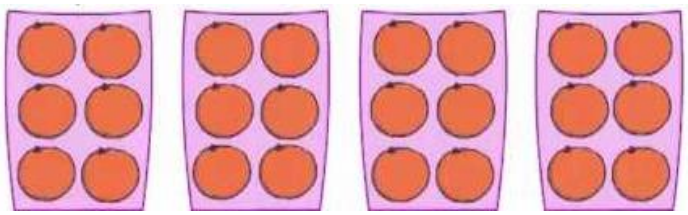
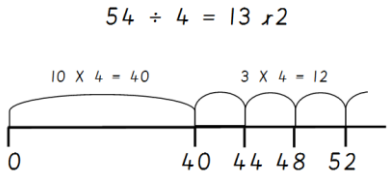
Concrete	Pictorial	Abstract
Grouping 	Bar Modelling ? | | | 24 24 ÷ 3 = ?	Using a Number Line 

Year 3 Objectives

- To recall and use division facts for the 3, 4 and 8 multiplication tables
- To write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- To solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Vocabulary

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

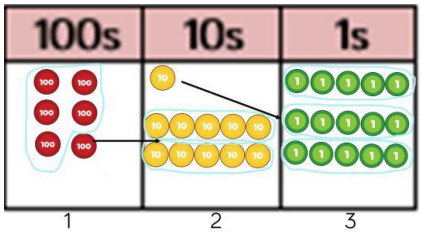
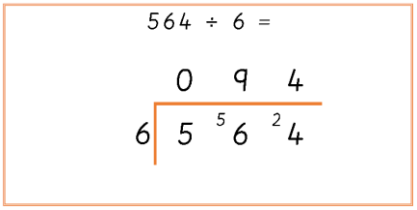
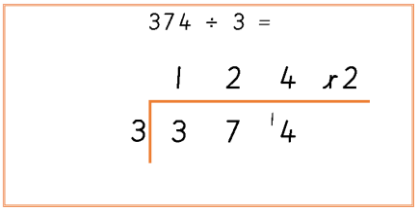
Concrete	Abstract
Grouping 	Number Line 

Year 4 Objectives

- To recall division facts for multiplication tables up to 12 × 12
- To use place value, known and derived facts to divide mentally, including: dividing by 1;

Vocabulary

factor, divisor, divided by, divided into, remainders, divisible by, equivalent, short division, derive, Quotient, inverse, remainder, multiples, exchange.

Concrete	Abstract
Using Place Value Counters 	Short Division Method  

Year 5 Objectives

- To divide numbers mentally drawing upon known facts
- To 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
- To divide whole numbers and those involving decimals by 10, 100 and 1000

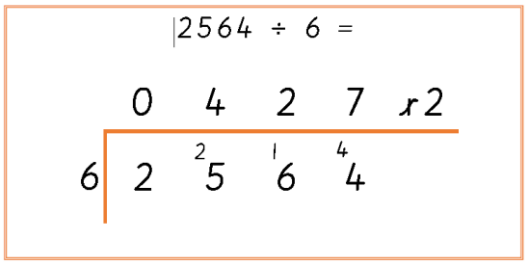
- To solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- To solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

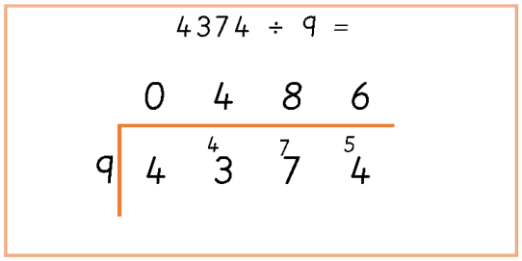
Vocabulary

divide, divided by, divided into, divisible by, remainder, quotient, inverse, decomposing, factor, decimal place, units, tenths, scaling, short division.

Abstract

Formal Written Method – Short Division



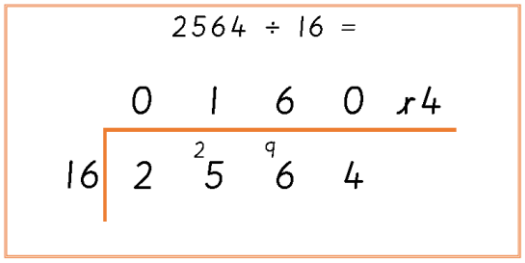
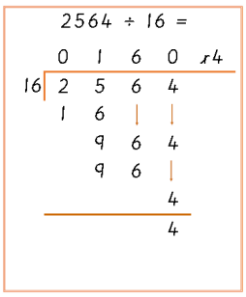
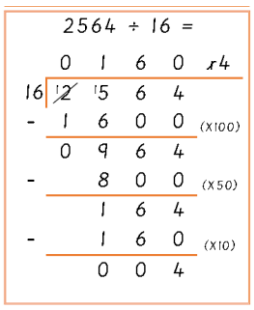


Year 6 Objectives

- To divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- To divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- To use their knowledge of the order of operations to carry out calculations involving the four operations
- To solve problems involving addition, subtraction, multiplication and division
- To use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Vocabulary

divide, divided by, divided into, divisible by, remainder, factor, quotient, inverse, decimal place, units, tenths, hundredths, scaling, formal written methods.

Abstract

Formal Written Method – Short and Long Division