



Eaton Square Prep School

Maths

Calculation

Policy 2021-2022

Eaton Square School believes that children should be introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas, they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the suitable strategy, recording in mathematics and in calculation is an important tool both for furthering the understanding of ideas and for communicating those ideas. A useful written method is one that helps children carry out a calculation and can be understood by others.

Written methods are corresponding to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and one efficient written method of calculation for addition, subtraction, multiplication and division, which they know they can rely on when mental methods are not appropriate.

This document identifies progression in calculation strategies rather than specifying which method should be taught in a particular year group.

As children become more mature and confident with their calculation, they need to start following these 4 steps when approaching problems:



By the end of Year 6, children should be able to choose the most appropriate approach to solve a problem: making a choice between using jottings (an extended written method), an efficient written method or a mental method.

This policy contains the key procedures that will be taught within our school alongside practical resources. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

Year 1 - Addition

Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, ten more, two more, one more.

Method

Children will be taught to use a number track to support addition

Example

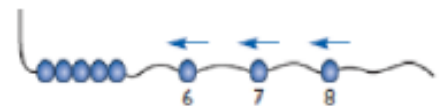
$$4 + 2 = 6$$



Bead strings and counting sticks will be used to support addition

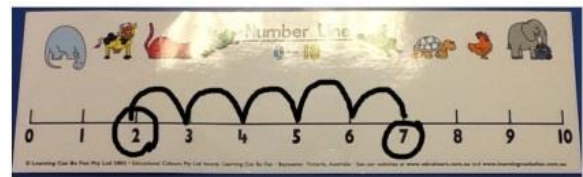
$$5 + 3 = 8$$

$$5 + 3 = 8$$



Children will use a prepared number line to solve simple addition stories and number sentences

$$2 + 5 = 7$$



Children will be taught how to solve simple addition stories with the support of a 100 number square

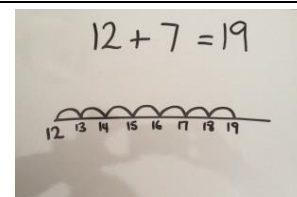
Count on in ones/tens, e.g knowing $45 + 1$ or $45 + 10$ without counting on in ones.

$$11 + 7 = 18$$

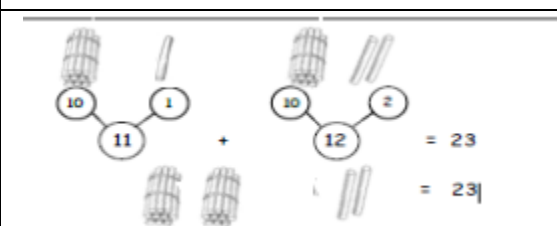


Children are taught how to use a blank number line for addition and then encouraged to draw their own number line to help solve problems

$$12 + 7 = 19$$

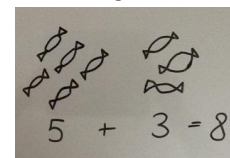


Children will partition numbers into tens and units when adding two 2-digit numbers that lie within the tens boundary



Children will solve one-step addition problems using concrete objects and/or pictorial representations

I have 5 sweets and I am given 3 more. How many do I have altogether?



Key Skills

- Reading and writing numbers to 100 in numerals.
- Writing numbers to 20 in words including correct spelling.
- Counting to and across 100 in ones.
- Counting in multiples of 2, 5 and 10.
- Solving simple one step addition problems: using objects, numberlines and images to support.

YEAR 2 - Addition

Vocabulary

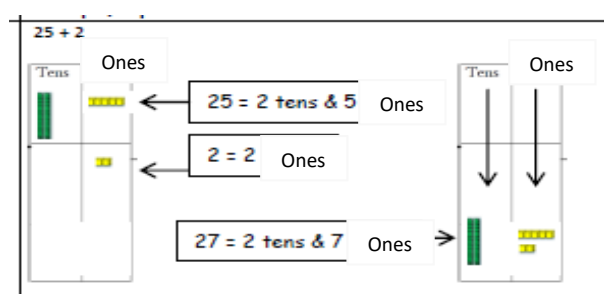
Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline, *sum*, *tens*, *ones*, *partition*, *addition*, *column*, *tens boundary*

Method

Children will use concrete objects and pictorial representations to add: a 2-digit number and ones, three 1-digit numbers and a 2-digit number and multiples of 10

Example

$25 + 2 =$



Children will partition numbers into tens and ones when adding two 2-digit numbers that cross the tens boundary

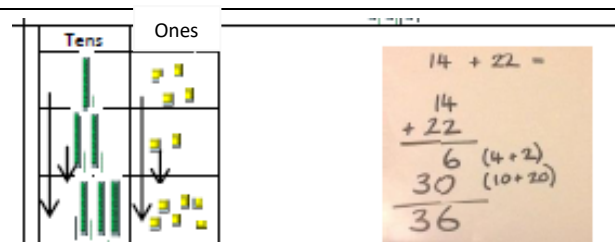
Partitioning, e.g. $55 + 37$ as $50 + 30$ and $5 + 7$ finally combining the two totals:
 $80 + 12 = 92$

$$\begin{array}{r} 50 \\ + 30 \\ \hline 80 \end{array} \quad \begin{array}{r} 5 \\ + 7 \\ \hline 12 \end{array} \quad \begin{array}{r} 80 \\ + 12 \\ \hline 92 \end{array}$$

$23 + 18 = 41$

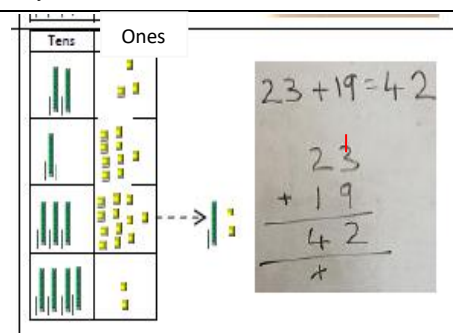
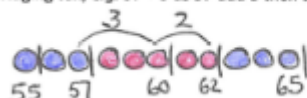


Children begin to set out TO + TO (that lie within the tens boundary) in columns and record as expanded column addition



Children begin to set out TO + TO (that cross the tens boundary) in columns and record as expanded column addition

Bridging ten, e.g. $57 + 5$ as 57 add 3 then add 2 more



Children will solve one and two-step subtraction problems using concrete objects and pictorial representations including those involving number, quantities and measures

Key Skills

- Number bonds – knowing all the pairs of numbers which make all the numbers to 10, and pairs with a total of 20
- Count on in ones and tens from any given 2-digit number
- Add two or three single-digit numbers
- Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10. (E.g. $45 + 4$, $38 + 7$)
- Add 10 and small multiples of 10 to any given 2-digit number
- Add any pair of 2-digit numbers

YEAR 3 - Addition

Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, number line, sum, tens, units, partition, addition, column, bridge, tens boundary, *hundreds boundary*, *increase*, *vertical*, *carry*, *expanded*, *compact*

Method

Example

Build on partitioning to develop expanded column addition with two 3-digit numbers.

$$246 + 132 = 378$$

$$200 + 40 + 6$$

$$\underline{100 + 30 + 2}$$

$$300 + 70 + 8 = 378$$

Expanded column addition with 'carrying'

$$337 + 188 = 525$$

$$300 + 30 + 7$$

$$\underline{100 + 80 + 8}$$

$$400 + 110 + 15 = 525$$

Children set out HTO + HTO (that cross the tens boundary) in columns and record as column addition

$$423 + 139 =$$

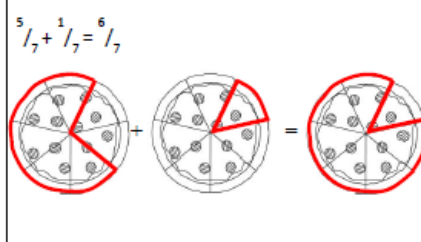
$$\begin{array}{r} 423 \\ + 139 \\ \hline 562 \end{array}$$

Children set out HTO + HTO (that cross the tens and hundreds boundaries) in columns and record as column addition

$$362 + 179 =$$

$$\begin{array}{r} 362 \\ + 179 \\ \hline 541 \end{array}$$

Recognise fractions which add to 1 e.g. $\frac{1}{4} + \frac{3}{4}$ or $\frac{2}{5} + \frac{3}{5}$
Add fractions with the same denominator



Key Skills

- Read and write numbers to 1000 in numerals and words.
- Add 2 digit number 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 units).
- Continue to practice many different mental addition strategies including adding to the nearest multiple of 10, 100, 1000 and adjusting, using number bonds, using near doubles, partitioning and recombining etc.

YEAR 4 - Addition

Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact, *thousands*, *hundreds*, *digits*, *inverse*.

Method

LA children – build on expanded column addition to develop compact column addition with larger numbers

Example

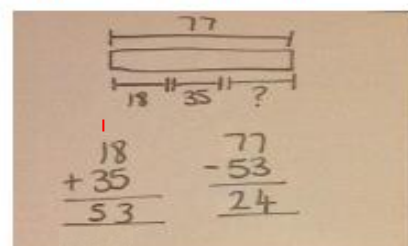
$$\begin{array}{r}
 1000 \quad 400 \quad 60 \quad 6 \\
 + 4000 \quad 800 \quad 60 \quad 8 \\
 \hline
 1000 \quad 100 \quad 10 \\
 \hline
 6000 \quad 300 \quad 30 \quad 4
 \end{array}$$

Children will add up with 4 digits using the formal written method of column addition

$$\begin{array}{r}
 2345 \\
 + 1792 \\
 \hline
 4137
 \end{array}$$

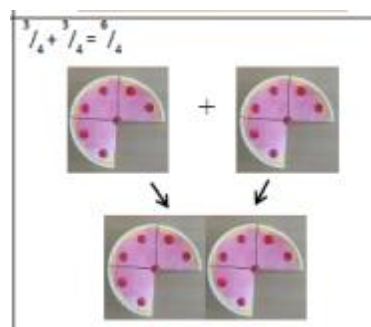
Solve two-step word problems using jottings and explaining reasoning behind their calculations (Singapore bar method)

Seb has 77 cubes. He builds two towers. One tower uses 18 cubes and one tower uses 35 cubes. How many cubes does he have left over?



Pupils continue practise in adding fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole

$$3/4 + 3/4 = 6/4$$



Key Skills

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of every digit in a 4 digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2 step problems in different contexts, picking the correct operation to use.
- Find 100 more or less than a number.
- Continue to use a wide range of mental addition methods.
- Add numbers with up to 4 digits using column addition.

YEAR 5 - Addition

Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, *decimal place, decimal point, tenths, hundredths, thousandths.*

Method

Example

Children will add numbers with more than 4-digits using the formal written method of column addition

$$\begin{array}{r} 45867 \\ + 32192 \\ \hline 78059 \end{array}$$

Children will add decimal numbers with the same number of decimal places using the formal written method column addition

The decimal point needs to be lined up just like all of the other place value columns and must be remembered in the answer column. It is important children understand why this is and get into this habit very quickly.

$$\begin{array}{r} 3.17 \\ + 4.25 \\ \hline 7.42 \end{array}$$

Children will add decimal numbers with a different number of decimal places using the formal written method column addition using 0 as a place value holder

Remember!

- 1) It is important that children say 6 tenths add 9 tenths so they understand that they are adding part of a number not a whole number.
- 2) Empty places should be filled with a zero to show the value of that place.

$$\begin{array}{r} 3.460 \\ + 3.792 \\ \hline 7.252 \end{array}$$

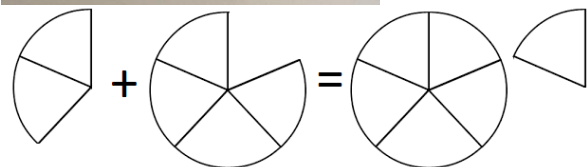
Zero used as a place value holder.

Children will recognise mixed numbers and improper fractions and convert from one to the other.

$$1\frac{1}{4} = \frac{5}{4}$$

Children will practise adding fractions where calculations exceed one as a mixed number

$$\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$$



Key Skills

- Add increasingly large numbers mentally using an expanding range of strategies.
- Use rounding to check answers and make estimates.
- Understand the place value of tenths and hundredths.
- Solve multi step problems in different contexts, deciding which operations and methods to use and explaining why.
- Read, write, order and compare number to 1 million.
- Round any number to 1 million to the nearest 10, 100, 1000, 10 000 or 100 000.
- Add numbers with more than 4 digits using column addition.

YEAR 6 - Addition

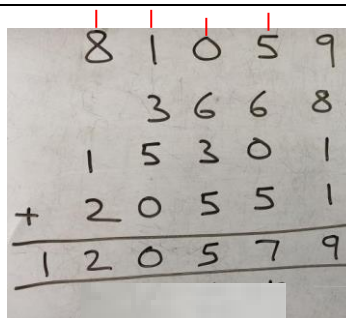
Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, decimal place, decimal point, tenths, hundredths, thousandths, *integer*

Method

Children will add several numbers of increasing complexity

Example



Children will add several decimal numbers with a different number of decimal places

23.361 + 9.08 + 59.77 + 1.3 = 93.511

Zero used as a place value holder.

Add fractions and mixed numbers with different denominators using the concept of equivalent fractions

$\frac{3}{4} + \frac{7}{8} = 1\frac{5}{8}$

$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$

$\frac{6}{8} + \frac{7}{8} = \frac{13}{8} = 1\frac{5}{8}$

$(\frac{6}{8} = \frac{3}{4})$

$\frac{6}{8} + \frac{7}{8} = \frac{13}{8}$

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.
- Read, write order and compare numbers to 10 million and understand the value of each digit.
- Round any whole number to the nearest 10, 100, 1000, 10 000, 100 000, 1 000 000 or 10 000 000
- Round decimal numbers to the nearest whole number.

YEAR 1 – Subtraction

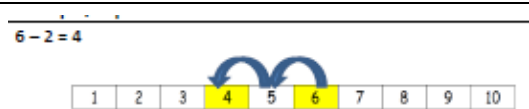
Vocabulary

Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is _?

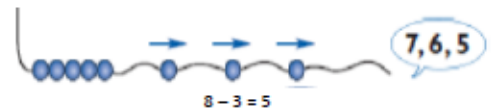
Method

Example

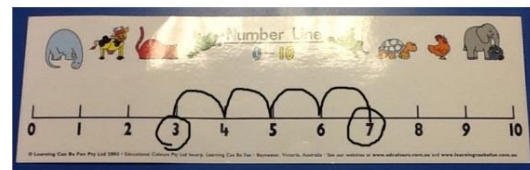
Children will be taught to use a number track to support subtraction by counting backwards



Bead strings and counting sticks will be used to support subtraction by counting backwards



Children will use a prepared number line to solve simple subtraction stories and number sentences by counting backwards



Children will be taught how to solve simple subtraction stories with the support of a 100 number square.

$$20 - 4 = 16$$



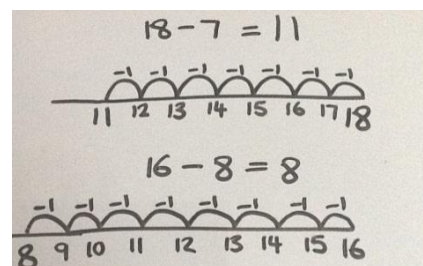
Counting back in tens, e.g. knowing 53-1 or 53-10 without counting back in ones.

$$33 - 10 = 23$$



Children are taught how to use a blank number line for subtraction (counting backwards) and then encouraged to draw their own number line to help solve problems

Children will begin with TO – O that lie within the tens boundary then move onto TO – O that cross the tens boundary



Children will solve one-step subtraction problems (including missing number problems) using concrete objects and pictorial representations



Key Skills

- Given a number, say one more or one less.
- Count to and over 100, forward and back from any number in 1s.
- Represent and use subtraction facts to 20 and within 20.
- Subtract with one digit and 2 digit numbers to 20, including zero.
- Solve one step problems that involve subtraction using objects, pictures and numbered lines.
- Read and write numbers to 100 in numerals.
- Write numbers in words to 20s, including correct spelling.

YEAR 2 – Subtraction

Vocabulary

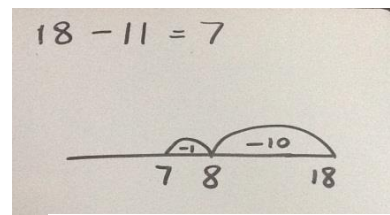
Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is? *count on, strategy,*

Method

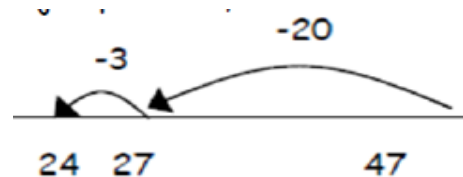
Children are encouraged to use a blank number line to solve TO – TO and count back in tens and then ones by:

- Positioning the first number in the number sentence at the end of the number line.
- Partitioning the second number into tens and units
- Counting back in tens
- Counting back in ones

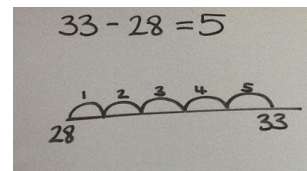
Example



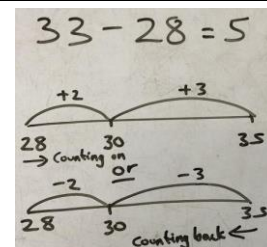
Counting back in multiples of ten and do not have to partition tens and units separately.



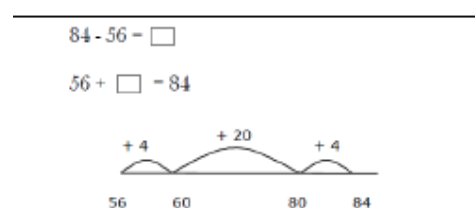
Children will use their knowledge of difference to use a blank number line to count on from the smallest number to the largest number (in tens and ones) to solve subtraction number sentences (TO – TO)



Children will be encouraged to draw their own number line and begin to decide on the most efficient strategy: whether to start with the smaller number and count on or start with the larger number and count back



Recognise and use inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems



Children will use partitioning to complete subtraction sums.

$$45 - 13$$

$$40 - 10 = 30$$

$$5 - 3 = 2$$

$$30 + 2 = 32$$

Children will solve one and two-step subtraction problems using concrete objects and pictorial representations including those involving number, quantities and measures

Key Skills

- Recognise the place value of each digit in a 2 digit number.
- Recall and use subtraction facts to 20 fluently, use to derive related facts to 100.
- Subtract using objects, images, 100 squares and mentally including a two digit number and ones, a two digit number and 10s and two 2 digit numbers.
- Understand and show that subtraction calculations cannot be done in any order.
- Use the inverse relationship between + and – to check calculations and solve missing number problems.
- Solve simple subtraction problems in context using written and mental methods.

Read and write numbers to at least 100 in numerals and words.

YEAR 3 – Subtraction

Vocabulary

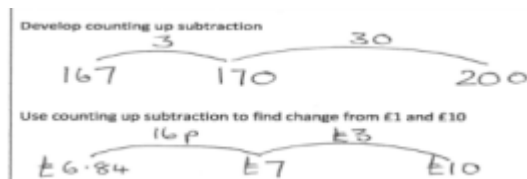
Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is $_?$, count on, strategy, partition, tens, units, *exchange*, *decrease*, *hundreds*, *value*, *digit*

Method

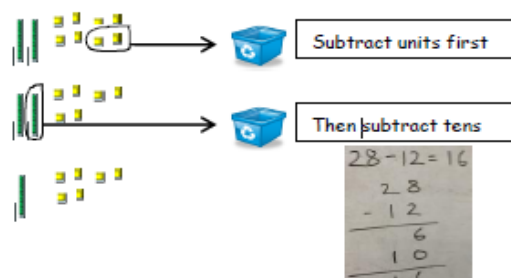
Example

Children to continue to develop counting on strategies for subtraction.

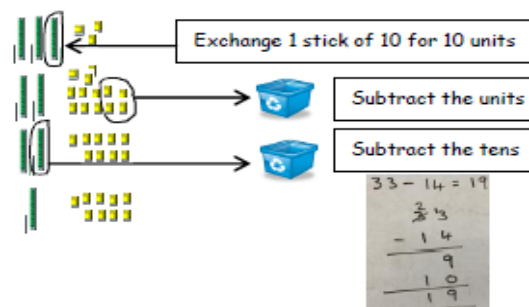
Use counting on method for decimal and money problems



Children begin to set out TO - TO (that lie within the tens boundary) in columns and record as column subtraction



Children begin to set out TO - TO (that cross the tens boundary) in columns and record as column subtraction with decomposition

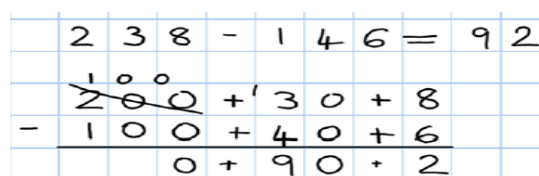


Children begin to set out HTO - TO (that lie within the tens boundary) in columns and record as column subtraction

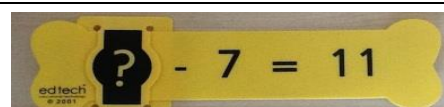
$$89 - 35 = 54$$

$$\begin{array}{r} 80 + 9 \\ - 30 + 5 \\ \hline 50 + 4 \end{array}$$

Children begin to set out HTO - TO (that cross the tens boundary) in columns and record as column subtraction with decomposition



Children will solve one and two-step subtraction problems (including missing number problems)



Recognise complements of any fraction

$$1 - \frac{1}{4} = \frac{3}{4} \text{ or } 1 - \frac{2}{3} = \frac{1}{3}$$

Key Skills

- Subtract mentally: a 3 digit number and 1s, a 3 digit number and 10s and a 3 digit number and 100s.
- 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 in a 3 digit number, 100s, 10s and 1s.
- Solving finding the difference problems using counting on.
- Reading and writing numbers up to 1000 in numerals and words.
- Practise and develop mental strategies including subtracting near multiples of 10 and adjusting, counting on etc.

YEAR 4 – Subtraction

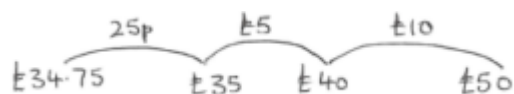
Vocabulary

Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is_?, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, *inverse*.

Method

Example

Children will use the 'counting on' method to find change from £10, £20, £50 and £100



Children will subtract numbers with up to 4-digits using the formal written method of column subtraction with decomposition

$$\begin{array}{r} 3271 - 1691 = \\ \underline{1580} \end{array}$$

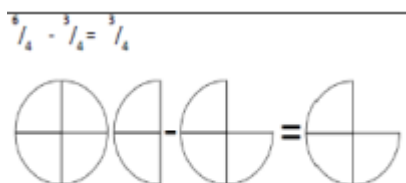
Solve two-step problems using formal jottings and explaining reasoning behind their choice of operation and calculations

932 – 457 becomes

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ 9 \quad 3 \quad 2 \\ - 4 \quad 5 \quad 7 \\ \hline 4 \quad 7 \quad 5 \end{array}$$

Answer: 475

Pupils continue to practise subtracting fractions with the same denominator to become fluent through a variety of increasingly complex problems beyond one whole



Children will use partitioning to subtract 3 digit numbers.

$$\begin{array}{l} 386 - 151 \\ 300 - 100 = 200 \\ 80 - 50 = 30 \\ 6 - 1 = 5 \end{array}$$

Key Skills

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select a mental, written or jotting method depending on what the problem requires.
- Children estimate and use the inverse operation to check a problem.
- Children solve 2 step problems involving + and -, picking the correct operation and method.
- Children solve simple money and measure problems with fractions and decimals.
- Find 1000 more or 1000 less than a given number.
- Count backwards through zero including negative numbers.
- Recognise the place value of each digit in a 4 digit number.
- Round any number to the nearest 10, 100 or 1000.
- Solve number and practical problems that involve increasingly large positive integers.

YEAR 5 – Subtraction

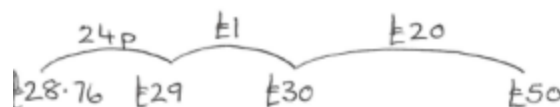
Vocabulary

Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is $_?$, count on, strategy, partition, tens, ones, exchange, decrease, hundreds, value, digit, inverse, *tenths*, *hundredths*, *decimal place*, *decimal*

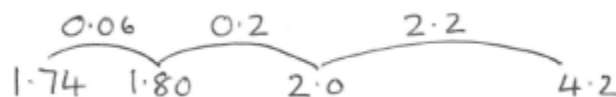
Method

Example

Children will use the counting up method when dealing with money, e.g. £50-£28.76



Children will use the counting up subtraction to subtract decimal numbers, e.g. 4.2-1.74



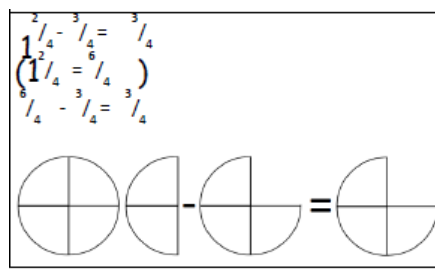
Children will subtract numbers with more than 4-digits using the formal written method of column subtraction with decomposition

$$\begin{array}{r} 63719 - 32831 = \\ \begin{array}{r} 63719 \\ - 32831 \\ \hline 30888 \end{array} \end{array}$$

Children will subtract decimal numbers with the same number of decimal places with decomposition

$$\begin{array}{r} 4.63 - 2.91 = \\ \begin{array}{r} 4.63 \\ - 2.91 \\ \hline 1.72 \end{array} \end{array}$$

Children will practise subtracting fractions where calculations exceed one as a mixed number



Key Skills

- Subtract mentally with increasingly large numbers.
- Use rounding and estimation to check answers to calculations.
- Solve addition and subtraction multi step problems, deciding which operations to use and why.
- Read, write, order and compare numbers to at least 1 million and understand the value of each digit.
- Count forwards or backwards in steps of powers of 10 up to 1 million.
- Understand negative numbers in context and count forwards and backwards through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

YEAR 6 – Subtraction

Vocabulary

Equal to, take, take away, less, minus, subtract, leaves, distance between, difference between, how many more, how many fewer/less than, most, least, count back, how many left, how much less is_?, count on, strategy, partition, tens, ones, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal place, decimal

Method

Example

Children will subtract several numbers of increasing complexity and be taught to combine some of the numbers so that the subtraction can be completed

$$\begin{array}{r} 63719 - 2352 - 175 = \\ 63719 \\ - 2352 \\ \hline 61367 \\ - 175 \\ \hline 61192 \end{array}$$

Children will subtract decimal numbers with a different number of decimal places with decomposition

$$\begin{array}{r} 3.21 - 1.8 = \\ 3.21 \\ - 1.80 \\ \hline 1.41 \end{array}$$

Zero used as place value holder

Children will subtract several decimals numbers with a different number of decimal places be taught to combine some of the numbers so that the subtraction can be completed.

$$\begin{array}{r} 7.35 - 2.1 - 1.675 = \\ 7.35 \\ - 1.675 \\ \hline 5.675 \\ - 2.100 \\ \hline 3.575 \end{array}$$

Zero used as place holder

Solve multi-step problems using formal jottings and explaining reasoning behind their calculations. The example shows a mastery level question where children have to find the missing numbers in the question as well as the answer.

$$\begin{array}{r} 86212 \\ - 17174 \\ \hline 69038 \\ - 39038 \\ \hline 30000 \end{array}$$

Subtract fractions and mixed numbers with different denominators using the concept of equivalent fractions

$$\begin{array}{l} \frac{4}{6} - \frac{1}{3} = \frac{2}{6} \\ \frac{1}{3} \times \frac{2}{2} = \frac{2}{6} \\ \frac{4}{6} - \frac{2}{6} = \frac{2}{6} \end{array}$$

Key Skills

- Solve addition and subtraction multi step problems in context, deciding which operations to use and why.
- Read, write, order and compare numbers to at least 10 million and understand the value of each digit.
- Round any whole number up to 10 million to the nearest 10, 100, 1000, 10 000, 100 000, or 1 million.
- Use negative numbers in context and calculate intervals across zero.
- Look at a calculation and decide whether you need to use a mental method, a jotting, a written method or a calculator to solve.

YEAR 1 –Multiplication

Vocabulary

Groups of, lots of, times, array, altogether, multiply, count

Method

Children will count groups of the same number of objects and add them together.

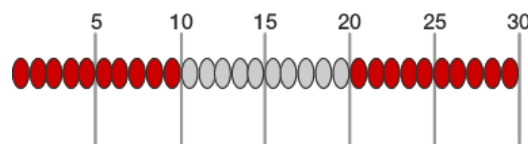
The children learn about grouping in practical contexts, through pictorial representation

Bead strings and counting sticks will be used to support counting in sequences of 2s, 5s and 10's

Children will recognise and complete patterns and sequences involving multiples of 2, 5 and 10

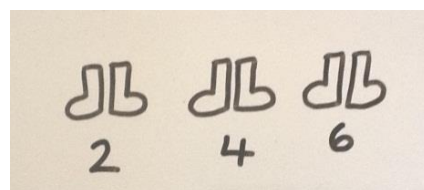
Example

1) I have 5 pairs of socks in the bag. How many socks are there?



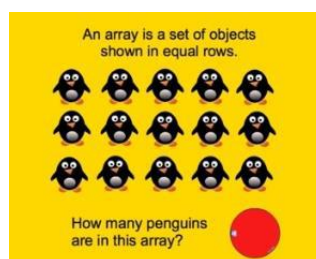
Children will be given one-step word problems to solve, involving counting in multiples of 2, 5 and 10 and doubles. Children will use concrete objects and pictorial representations to support their ideas

Alfie, Joseph and Ben all have a pair of socks. How many socks are there altogether?



Children will be introduced to an array to support multiplication and to support the understanding that multiplication is repeated addition

$$5 + 5 + 5 = 15$$



Key Skills

- Count in multiples of 2, 5 and 10.
- Solve 1 step problems involving multiplication using objects, arrays or pictures with support.
- Make connections between arrays and counting in 2s, 5s and 10s.
- Begin to understand doubling using objects and pictorial representations.
- Solve practical problem solving activities counting equal sets or groups.
- Have lots of practice counting and bundling groups of objects into 2s, 5s and 10s.

YEAR 2 –Multiplication

Vocabulary

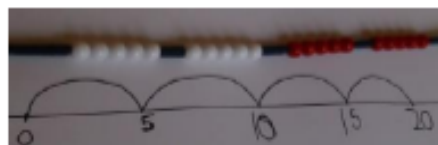
Groups of, lots of, times, array, altogether, multiply, count, *multiplied by*, *repeated addition*, *column*, *row*, *commutative*, *sets of*, *equal groups*, *times as big as*, *once*, *twice*, *three times*

Method

Children will understand the operation of multiplication as repeated addition on a blank number line and will use practical resources to support this

Example

$$4 \times 5 = 20$$



Children will be able to represent a multiplication calculation using an array and write the multiplication symbol within a number sentence. Children will also understand that multiplication can be carried out in any order (commutative)

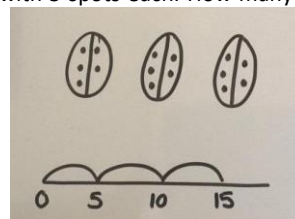
$$3 \times 5 = 15$$



$$5 \times 3 = 15$$

Children will solve one-step multiplication problems (including missing number problems) using concrete objects and pictorial representations

I have 3 ladybirds with 5 spots each. How many spots do they have altogether?



To begin to know doubles of multiples of 5 to 100

e.g. double 35 is 70

Children practise learning times tables facts up to 10.

Start learning 2x, 5x, 10x tables, relating these to 'Clever counting' in 2s, 5s, and 10s, *e.g. 5 x 10 = 50, and 10, 20, 30, 40, 50 is five steps in the tens count*

Key Skills

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

YEAR 3 –Multiplication

Vocabulary

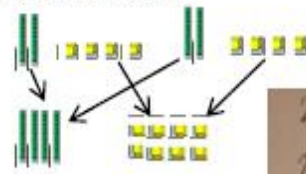
Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, *partition*, *grid method*, *multiple*, *product*, *tens*, *ones*, *value*

Method

Children will learn to calculate doubles of 2-digit numbers through partitioning

Example

Double 24 = $24 + 24 = 48$



$$24 + 24 = 48$$

$$20 + 20 = 40$$

$$4 + 4 = 8$$

$$40 + 8 = 48$$

Children will be taught to multiply numbers (TO x O) through partitioning and the formal written method of grid multiplication

$$23 \times 4 = 92$$

\times	20	3	
4	80	12	80
			+ 12
			92

Children will be taught to multiply numbers (TO x O) using the formal written method of expanded column multiplication and make the link to grid method

$$23 \times 4 = 92$$

\times	23	
4	12	(4 x 3)
+	80	(4 x 20)
	92	

Children will solve problems and word problems involving multiplication, including scaling



Key Skills

- Recall and use multiplication facts for the 2,3,4,5,6 and 10 multiplication tables and multiply multiples of 10.
- Write and calculate number sentences using known x tables.
- Answer 2 digit x 1 digit problems using mental and written methods.
- Solve multiplication problems in context including missing number problems.
- Develop mental strategies using commutativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and for missing number problems.

YEAR 4 –Multiplication

Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value, *inverse*

Method

Children learn to use the grid method multiplication for 3 digit by 1 digit (HTO x O)

Example

x	200	50	3	
6	1200	300	18	= 1518

Children use grid method for multiplication for 2 digit by 2 digit numbers

x	40	6	
10	400	60	
8	320	48	
	720	108	
			= 828

Children will be taught to multiply numbers (HTO x O) using the formal written method of short multiplication and will link with the Distributive Law method

$$\begin{array}{r} 235 \times 6 = 1410 \\ \begin{array}{r} 235 \\ \times 6 \\ \hline 1410 \end{array} \end{array}$$

Solve problems involving multiplying and adding to multiply two or three-digit numbers by one digit

Harriet has 7 friends who each have 24 apples. Joseph has 3 friends who each have 27 apples. How many apples do Harriet and Joseph's friends have altogether?

$$\begin{array}{r} 24 \times 7 \\ \begin{array}{r} 24 \\ \times 7 \\ \hline 168 \end{array} \end{array} \quad \begin{array}{r} 27 \times 3 \\ \begin{array}{r} 27 \\ \times 3 \\ \hline 81 \end{array} \end{array} \quad \begin{array}{r} 168 \\ + 81 \\ \hline 249 \end{array}$$

249 apples altogether

Key Skills

- Count in multiples of 6,7,8,9,25 and 1000.
- Recall multiplication facts for all multiplication tables up to 12 x 12.
- Recognise place value of digits in up to 4 digit numbers.
- Multiply large numbers and multiple values mentally using place value, known facts and derived facts.
- Use commutativity mentally to solve problems.
- Solve problems in a range of contexts that are increasingly complex.

YEAR 5 –Multiplication

Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value, inverse, square, factor, integer, decimal, short/long multiplication, carry

Method

Example

Children will be taught to multiply numbers (TO x TO) by partitioning the second 2-digit number and using two short multiplications along with addition to solve the problem

$$\begin{array}{r}
 42 \times 24 = 1008 \\
 \begin{array}{r}
 42 \\
 \times 20 \\
 \hline
 840
 \end{array}
 \quad
 \begin{array}{r}
 42 \\
 \times 4 \\
 \hline
 168
 \end{array}
 \quad
 \begin{array}{r}
 840 \\
 + 168 \\
 \hline
 1008
 \end{array}
 \end{array}$$

Children will be taught to multiply numbers (TO x TO) using the formal written method of long multiplication

$$\begin{array}{r}
 ^3 \\
 ^6 \\
 27 \\
 \times 59 \\
 \hline
 243 \\
 + 1350 \\
 \hline
 1593
 \end{array}$$

Children will be taught to multiply numbers (HTO x TO) using the formal written method of long multiplication

$$\begin{array}{r}
 153 \\
 \times 243 \\
 \hline
 459 \\
 6120 \\
 + 30600 \\
 \hline
 37179
 \end{array}$$

Children will be taught to multiply numbers (ThHTO x O) using the formal written method of short multiplication

$$\begin{array}{r}
 1423 \times 6 = 8538 \\
 \begin{array}{r}
 1423 \\
 \times 6 \\
 \hline
 8538
 \end{array}
 \end{array}$$

Children will be taught to multiply numbers (ThHTO x TO) using the formal written method of long multiplication

$$\begin{array}{r}
 4764 \times 68 \\
 \begin{array}{r}
 \text{Th H T O} \\
 4764 \times 68 \\
 \hline
 38112 \\
 285840 \\
 \hline
 323952
 \end{array}
 \end{array}$$

Step 1: Estimate what your answer will be.
 $5000 \times 70 = 350,000$
 Step 2: Multiply by the ones
 Put the zero in place
 Step 3: Multiply by the tens
 Step 4: Add them together

Children will be taught to multiply decimal numbers by decimal numbers. (1,2 and 3 decimal places)

$$\begin{array}{r}
 ^2 \\
 5.4 \\
 \times 2.7 \\
 \hline
 378 \\
 + 1080 \\
 \hline
 1458
 \end{array}
 \rightarrow
 \begin{array}{r}
 ^1 \\
 5.4 \\
 \times 3.7 \\
 \hline
 378 \\
 + 1620 \\
 \hline
 1998
 \end{array}$$

$1458 \rightarrow 1.458$
 $1998 \rightarrow 19.98$

Children will learn to multiply whole numbers and those involving decimals by 10, 100 and 1000 by moving the digits around the fixed decimal on a place value grid

$$\begin{array}{r}
 35 \times 10 = 350 \\
 35 \times 100 = 3500 \\
 35 \times 1000 = 35000 \\
 \begin{array}{r}
 \text{Th H T U } \cdot \frac{1}{10} \frac{1}{100} \frac{1}{1000} \\
 35 \cdot \\
 350 \cdot \quad (\times 10) \\
 3500 \cdot \quad (\times 100) \\
 35000 \cdot \quad (\times 1000)
 \end{array}
 \end{array}$$

Children will solve problems involving multiplication, including scaling

Alfie runs 3400m on Sports Day. His friend, Harry, runs three times as far. How far does Harry run?

With the use of materials and diagrams, pupils will multiply proper fractions and mixed numbers by whole numbers

$$\begin{array}{l}
 = \frac{1}{4} \times 2 = \frac{2}{4} \\
 1 \frac{1}{4} \times 2 = 2 \frac{2}{4}
 \end{array}$$

Key Skills

- Identify multiples and factors, using secure x table facts to 12 x 12.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10,100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems that have different combinations of operations, picking the most useful methods.

YEAR 6 –Multiplication

Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, ones, value, inverse, square, factor, integer, decimal, short/long multiplication, carry, *tenths, hundredths, decimals*

Method

Example

Multiply numbers by 10, 100 and 1000 where the answers are up to three decimal places

$2.345 \times 10 = 23.45$
 $2.345 \times 100 = 234.5$
 $2.345 \times 1000 = 2345$

Place value chart:

T	H	T	U	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
2	3	4	5			

23.45×10
 234.5×100
 2345×1000

Multiply one-digit numbers with up to two decimal places by whole numbers using:

- Short multiplication when multiplying by a single digit
- Long multiplication when multiplying by a 2-digit number

$1.27 \times 3 = 3.81$
 $1.27 \times 37 = 47.39$

To multiply decimal numbers by decimal numbers. (1,2 and 3 decimal places)

Multiply multi-digit numbers up to 4 digits by a 2-digit whole number using the formal written method of long multiplication

$5,280 \times 25 = 132,000$
 $5,280 \times 25 = 132,000$
 $5,280 \times 25 = 132,000$

Multiply simple pairs of fractions, writing the answer in its simplest form

$\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$

Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction

$\frac{1}{4} \text{ of } ? = 36$
 means $? \div 4 = 36$
 Use inverse
 $4 \times 36 = ?$
 144

Multiply proper and improper fractions, e.g. $\frac{3}{4} \times \frac{2}{3}$

Key Skills

- Multiply up to 4 digits by 2 digits using long multiplication.
- Solve mixed operation and large number problems using mental methods.
- 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 1 –Division

Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array

Method

Children will understand equal groups and share items out in play scenarios

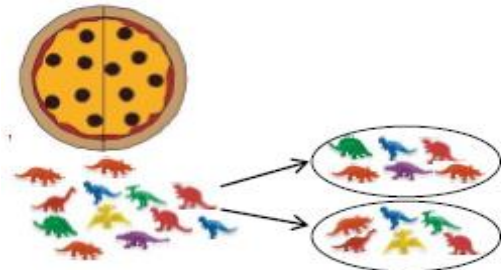
Example

Share 12 cakes between 3 people equally:



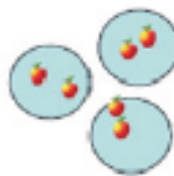
Children will be taught to associate 'half' with dividing by two and recognise, find and name a half as one of two equal parts

Can you cut the pizza in half?



Children will be given a word problem to complete either practically or using pictorial representations

Can you share 6 apples between 3 plates?



Children will recognise and write the division symbol (\div) in mathematical statements, calculating the answer with the teacher using concrete objects

$$8 \div 2 = 4$$



Key Skills

- Solve one step problems involving multiplication and division using concrete objects with support from adults.
- Children use grouping and sharing to understand division and to begin to understand finding simple fractions.
- Children make connections between arrays and counting in 2s, 5s and 10s.
- Children use halving and understand that this is the same as sharing into 2 equal groups.

YEAR 2 –Division

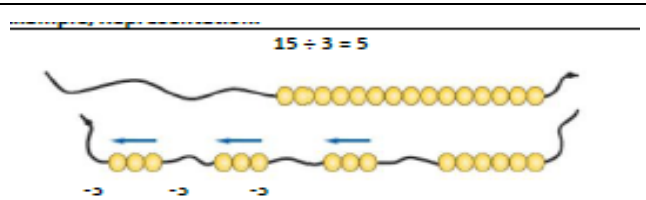
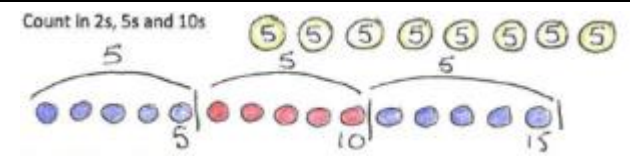
Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, *divided by*, *divided into*, *division*, *grouping*, *number line*, *left, left over*

Method

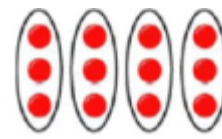
Example

Children will understand the operation of division as grouping using repeated subtraction on a prepared number line

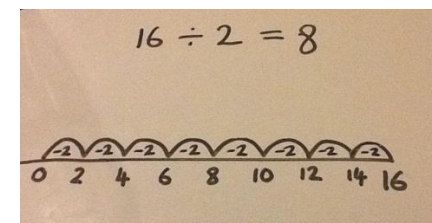


Children will be able to represent a division calculation using an array and write the division within a number sentence

How many groups of 3 are in 12?
 $12 \div 3 = 4$

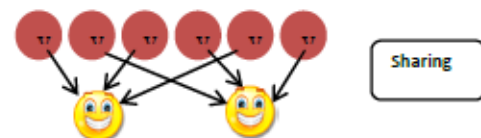


Children will use a blank number line to carry out repeated subtraction to solve a division number sentence



Children will be taught to understand the difference between sharing and grouping. Children will also connect unit fractions to equal sharing and grouping

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

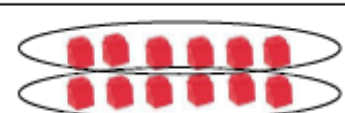


If there are 6 sweets, how many people can have 2 sweets each?



Children will solve one-step division problems (including missing number problems) using concrete objects and pictorial representations

$$12 \div \square = 6$$



Key Skills

- Count in steps of 2,3 and 5 from 0.
- Recall and use \times and \div facts for the 2,5 and 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 concrete objects, arrays, and simple written methods such as grouping on a numberline.

YEAR 3 –Division

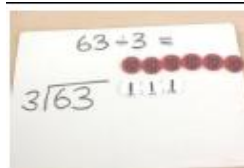
Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, *inverse*, *short division*, *carry*, *remainder*, *multiple*

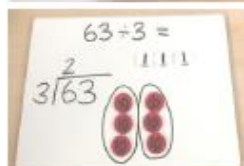
Method

Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist ($TO \div O$)

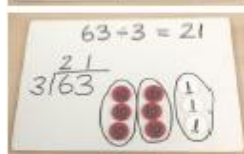
Example



Create the dividend using Place Value counters.



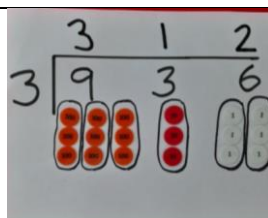
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.



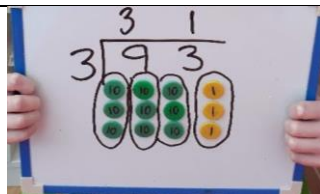
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.

The quotient can be seen across the groups.

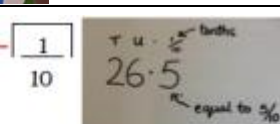
Children will use practical resources to support the short division method and will be encouraged to use multiples of the divisor to assist ($HTO \div O$)



Children will use practical resources to support solving division number sentences ($TO \div O$)



Pupils connect tenths to place value, decimal measures and that tenths is to divide by 10



$$\frac{1}{10} \text{ of } 50 = 5$$

$$50 \div 10 = 5$$

Key Skills

- Recall and use \times and \div facts for the 2,3,4,5,6,8 and 10 x tables (using doubling to connect the 2,4 and 8 x tables)
- Solving division problems where a 2 digit number is divided by a 1 digit number using mental and written.
- Solve problems in a variety of contexts including missing number problems.
- Pupils begin to derive related facts e.g. $9 \div 3 = 3$ means $90 \div 3 = 30$ or $90 \div 30 = 3$.
- Pupils develop confidence in written methods, moving from numberlines to short division.

YEAR 4 –Division

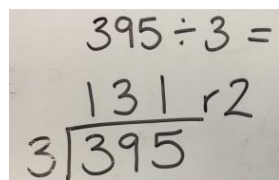
Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, *divisible by*, *factor*

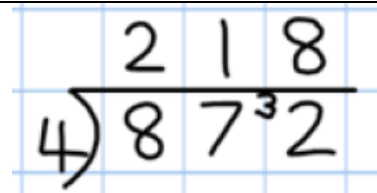
Method

Example

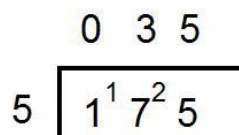
Children will use short division methods to support solving division number sentences with remainders but no exchange across the place value (HTO \div O)


$$\begin{array}{r} 131 \text{ r}2 \\ 3 \overline{) 395} \end{array}$$

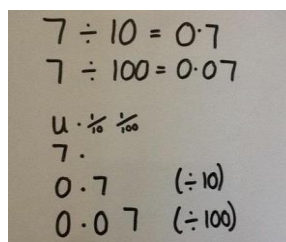
Children will use practical resources to support the short division method where exchange across place value columns occurs. (HTO \div O)


$$\begin{array}{r} 218 \\ 4 \overline{) 872} \end{array}$$

Children will use the short division method where exchange across the place value columns occurs. Pupils will be encouraged to use multiples of the divisor to assist (HTO \div TO)


$$\begin{array}{r} 035 \\ 5 \overline{) 035} \end{array}$$

Children will divide up to a 5 digit number by 10 and 100; identifying the value of the digits in the answer as ones, tenths and hundredths. Place value grids are used to aid this method.


$$\begin{array}{l} 7 \div 10 = 0.7 \\ 7 \div 100 = 0.07 \\ \begin{array}{c} \text{u} \cdot \frac{1}{10} \frac{1}{100} \\ 7 \cdot \\ 0.7 \quad (\div 10) \\ 0.07 \quad (\div 100) \end{array} \end{array}$$

Key Skills

- Recall multiplication and division facts for all numbers to 12 x 12.
- Use place value and known facts to derive facts mentally- including multiplying and dividing by 100, 10 and 1.
- Practise mental methods and extend this to three digit numbers using derived facts- e.g. $100 \div 5 = 20$ so $20 \times 5 = 100$.
- Solve two step problems with increasingly harder numbers in a range of contexts, using language to identify the correct operation.
- Correspondence problems should be introduced such as 3 cakes are shared equally between 10 children, 1 man has 6 cats so how many cats do 3 men have etc.

Vocabulary

YEAR 6 –Division

Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, carry, remainder, multiple, divisible by, factor, quotient, prime number, prime factors, composite number (non-prime), *common factor*

Method

Example

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of division

$$1599 \div 13 = 123$$

To divide decimal numbers by whole numbers

$$2.35 \div 5 = 0.47$$

To divide decimal numbers by decimals

6.85 \div 0.5 =

step 1 - multiply both numbers by 10, 100, 1000 in order to make the divisor a whole number. In this example, multiply each number by 10.

Step 2 - use the bus stop method:

$$68.5 \div 5 = 13.7$$

Interpret remainders as whole number remainders, fractions or decimals

$$849 \div 4 = 212 \text{ remainder } 3$$

Divide numbers decimal numbers with up to 3 decimal places by 10, 100 and 1000 by moving the digits around a fixed decimal

$$31.2 \div 10 = 3.12$$

$$31.2 \div 100 = 0.312$$

$$31.2 \div 1000 = 0.0312$$

Divide proper fractions by whole numbers

$$\frac{1}{3} \div 2 = \frac{1}{6}$$

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Key Skills

- Use multiplication and division facts up to 12 x 12 to solve more complex problems.
- Decide when to use short or long division and interpret remainders in a way that is appropriate to the problem.
- Perform mental calculations for problems involving large numbers and mixed calculations.
- Identify common factors, common multiples and prime numbers.
- Use estimation to check answers to calculations and determine accuracy.
- Use written methods of division to solve decimal problems up to 2 decimal places.
- Solve problems which require rounding to 10, 100, 1000 and beyond.