

Goldenhill Primary Academy



Calculation Policy September 2025

“Everyone Shines At Goldenhill”.

Mission statement:

Goldenhill Primary Academy provides a happy, friendly, secure and respectful environment; where everyone achieves their potential and develops a lifelong love for learning.



Goldenhill Primary Academy Maths Calculation Policy

2025-2026

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Maths Calculation Policy

2022-2023

Rationale:

This policy is intended to demonstrate how we teach different forms of calculation at Goldenhill Primary Academy . It is organised by year groups and designed to ensure progression for each operation in order to ensure smooth transition from one year group to the next. It also includes an overview of mental strategies required for each year group [Year 1-Year 6]. Mathematical understanding is developed through use of representations that are first of all concrete (e.g. base ten, apparatus), then pictorial (e.g. array, place value counters) to then facilitate abstract working (e.g. columnar addition, long multiplication).

It is important that conceptual understanding, supported by the use of representation, is secure for procedures and if at any point a pupil is struggling with a procedure, they should revert to concrete and/or pictorial resources and representations to solidify understanding or revisit the previous year's strategy.

This policy is designed to help teachers and staff members at our school ensure that calculation is taught consistently across the school and to aid them in helping children who may need extra support or challenges. It is expected that academies will work towards the fluency goals for each age group but that, where necessary, teachers will use approaches and materials from earlier year groups to bridge any gaps in a child's understanding.

This policy is also designed to help parents, carers and other family members support children's learning by letting them know the expectations for their child's year group and by providing an explanation of the methods used in our school.

Background to the CPA framework

- Children (and adults!) can find maths difficult because it is abstract. The CPA approach builds on children's existing knowledge by introducing abstract concepts in a concrete and tangible way. It involves moving from concrete materials, to pictorial representations, to abstract symbols and problems. The CPA framework is so established in Singapore maths teaching that the Ministry of Education will not approve any teaching materials that do not use the approach.

The Concrete Step of CPA

- Concrete is the “doing” stage. During this stage, students use concrete objects to model problems. Unlike traditional maths teaching methods where teachers demonstrate how to solve a problem, the CPA approach brings concepts to life by allowing children to experience and handle physical (concrete) objects. With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.

The Pictorial Step of CPA

- Pictorial is the “seeing” stage. Here, visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.
- Building or drawing a model makes it easier for children to grasp difficult abstract concepts (for example, fractions). Simply put, it helps students visualise abstract problems and make them more accessible.

The Abstract step of CPA

- Abstract is the “symbolic” stage, where children use abstract symbols to model problems. Students will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem. The abstract stage involves the teacher introducing abstract concepts (for example, mathematical symbols). Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols (for example, +, −, x, /) to indicate addition, multiplication or division.

Importance of CPA and apparatus used:

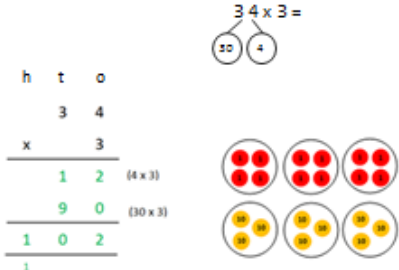
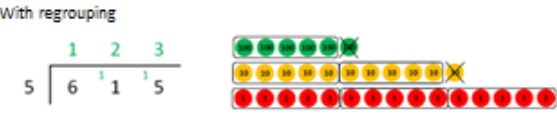
- The [MNP Primary Series](#) approach encourages teachers to vary the apparatus that children use in class. For example, students might one day use counters, another day they might use a ten frame. Likewise, children are encouraged to represent the day's maths problem in a variety of ways. For example, drawing an array, a number bond diagram or a bar model. By systematically varying the apparatus and methods used to solve a problem, children can craft powerful mental connections between the concrete, pictorial, and abstract phases. It is important to recognise that the CPA model is a progression. By the end of KS1, children need to be able to go beyond the use of concrete equipment to access learning using either pictorial representations or abstract understanding. What is important, therefore, is that all learners, however young, can see the connections between each representation.

Maths Calculation Policy 2022-2023

How do I use this calculation policy?

Each page follows a similar format to help you find the information you need. Addition is paired with subtraction and division with multiplication as these operations are the inverse (opposite) of each other.

These are the objectives from the National Curriculum.

NON-negotiable year group coverage:	
- recall multiplication and division facts for multiplication tables up to 12×12 - multiply two-digit and three-digit numbers by a one-digit number using formal written layout - divide a three-digit number by a one-digit number - estimate and use inverse operations to check answers to a calculation - solve problems involving multiplying and dividing, including the distributive law to multiply a two digit number by a one digit number, integer scaling problems and harder correspondence problems such as n objects are connecting to m objects	
Multiplication	Division
Expanded short multiplication of a two-digit number by single digit numbers.  <i>(children could use concrete counters or draw working out as a pictorial representation)</i> Vocabulary: lots of, groups, repeat, times, multiply, steps of, multiplied by, multiple of, double, product, expanded short multiplication.	Short division of 2-digit and 3-digit number by single digit numbers. Without regrouping  <i>(ensure are children are grouping not sharing)</i> With regrouping  <i>(children could use concrete counters or draw working out as a pictorial representation)</i> <i>NB Children can be exposed to remainders at this stage but it should not act as a specific teaching point until Year 5.</i> Vocabulary: sharing, share equally, into groups, equal, divided by, divided into, left over, remainder, how many groups, divisible by, how many ___ go into ___? inverse, quotient, divider, short division, regrouping

These examples show you the types of work and methods that children will be using in class.

This is some of the vocabulary that will be used in lessons and that the children are expected to know.

Year Reception – Maths Calculation Policy

NON-negotiable year group coverage:

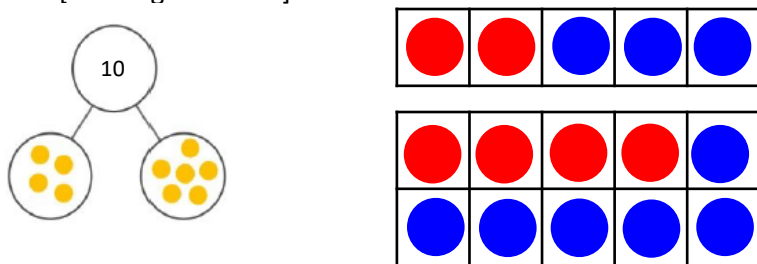
- Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer [within 10]
- Say one more and one less than a number

What adults could do:

- Use mathematical vocabulary and demonstrate methods of recording, using standard notation where appropriate
- Encourage children to make up their own story problems for other children to solve.

Addition

Composing numbers using concrete apparatus such as five / ten frames [working within 10]

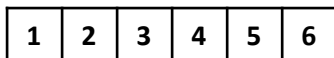


Addition as increasing by combining two or more groups using concrete apparatus. Children construct calculations verbally or using cards [encourage notations when appropriate]



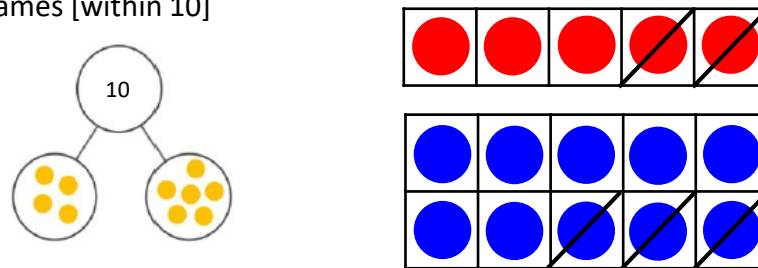
$$3 + 1 = 4$$

Number tracks can be used to support finding one more than a given number.



Subtraction

Decomposing numbers using concrete apparatus such as five / ten frames [within 10]

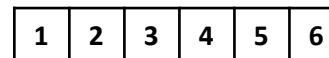


Subtraction as decreasing, taking away and finding the difference using concrete apparatus. Children construct calculations verbally or using cards [encourage notations when appropriate]



$$5 - 2 = 3$$

Number tracks can be used to support finding one more than a given number.



Vocabulary: add, plus, and, altogether, more, make, sum, total, how many more to make? numbers [zero – twenty and beyond], greater

Vocabulary: Subtract, take away, minus, leave, less, left over, how many are left, how many are gone, fewer

Year Reception – Maths Calculation Policy

NON-negotiable year group coverage:

- Solve problems, including doubling, halving and sharing.

What adults can do:

- Use mathematical vocabulary and demonstrate methods of recording, using standard notation where appropriate.
- Talk about the methods children use to answer a problem they have posed, e.g. 'Get one more, and then we will both have two.'
- Encourage children to extend problems, e.g. "Suppose there were three people to share the bricks between instead of two."

Multiplication

Multiplication can be introduced through repeated addition and doubling related to real life contexts.

Can you double the amount of spots on the ladybird?



This can be extended to writing the calculation by using addition [$5+5=10$].

Exceeding expectation - Children solve practical problems that involve combining groups of 2, 5, or 10.

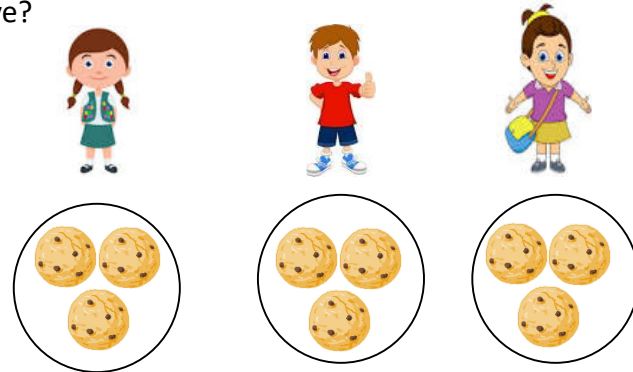
How many wheels are there altogether?



Division

Dividing by sharing into equal groups related to real life contexts.

There are 3 children and 12 biscuits. How many will each child have?



Dividing by practically halving an amount.



(children can show division using concrete apparatus and pictorial representations)

Vocabulary: Doubles, groups, ___ times, once, twice, lots of, groups of, repeated addition.

Vocabulary: Sharing, into groups, , halve, share, one each... two each... three each etc.

Year 1 – Mental Calculations

Non-negotiable year group coverage:

- number bonds ['story of' 2, 3, 4, 5, 6, 7, 8, 9 and 10]
- count forwards and backwards in ones from a given two-digit number
- count forwards and backwards in tens from any given two-digit number
- add and subtract ten from any given number
- add and subtract one single digit with another single digit
- add three single digits, spotting pairs which make 10
- find one more and one less
- count to and across 100, forwards and backwards
- add by putting the largest number first
- represent and use number bonds and related subtraction facts within 20
- Understand the concept of equality for the = sign [$2 = 1 + 1$ / $2 + 3 = 4 + 1$]

- begin to count in multiples of 2s, 5s and 10s
- begin to say what three times 5 is by counting in 5s
- double numbers to 10
- find half of even numbers up to 12 and know it is hard to halve odd numbers
- find half of even numbers by sharing
- Begin to use concrete and pictorial representations of 'groups of' to find how many sets of a small number make a greater number

Addition

Using place value

1	2	3	4	5	6
11	12	13	14	15	16
21	22	23	24	25	26
31	32	33	34	35	36
41	42	43	44	45	46

$23 + 10 = 33$

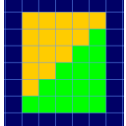
Counting on

Count on in ones eg. $11 + 2$

Count on in tens eg. $45 + 20$ as 45, 55, 65

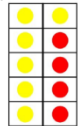


Using number facts (ITP)

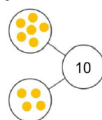


$0 + 5 = 5$
 $1 + 4 = 5$
 $2 + 3 = 5$
 $3 + 2 = 5$ etc

(Ten frames / part-part whole)



$$\begin{aligned} 6 + 4 &= 10 \\ 4 + 6 &= 10 \\ 10 - 4 &= 6 \\ 10 - 6 &= 4 \end{aligned}$$

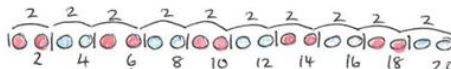


$$\begin{aligned} 6 + 4 &= 10 \\ 4 + 6 &= 10 \\ 10 - 4 &= 6 \\ 10 - 6 &= 4 \end{aligned}$$

Multiplication

Counting in steps

Count in 2s and 10s



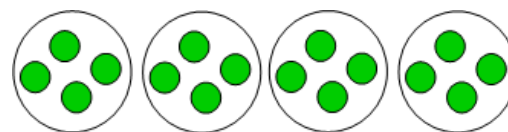
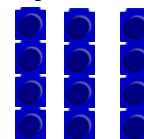
Doubling and halving

Find doubles to double 6 using fingers



Grouping

Begin to use visual and concrete apparatus to find the answers to '3 lots of 4' or '2 lots of 5' etc.



Subtraction

Using place value

2	3	4	5	6
12	13	14	15	16
22	23	24	25	26
32	33	34	35	36
42	43	44	45	46

$24 - 10 = 14$

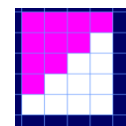
Taking away

Count back in ones eg. $14 - 5$

Count back in tens eg. $35 - 20$ as 35, 25, 15

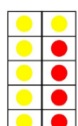


Using number facts (ITP)

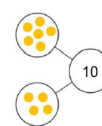


$4 + 0 = 4$
 $3 + 1 = 4$
 $2 + 2 = 4$ etc

(Ten frames / part-part whole)



$$\begin{aligned} 6 + 4 &= 10 \\ 4 + 6 &= 10 \\ 10 - 4 &= 6 \\ 10 - 6 &= 4 \end{aligned}$$

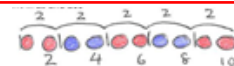


$$\begin{aligned} 6 + 4 &= 10 \\ 4 + 6 &= 10 \\ 10 - 4 &= 6 \\ 10 - 6 &= 4 \end{aligned}$$

Division

Counting in steps

Count in 2s and 10s



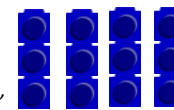
Doubling and halving

Find half of numbers up to 12



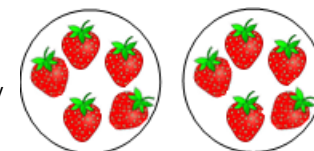
Grouping

Begin to use visual and concrete arrays and 'sets of' objects to find the answers to 'How many towers of 3 can I make with 12 cubes?'



Sharing

Begin to find $\frac{1}{2}$ of a quantity using sharing
 eg. I have 10 strawberries and share them with my friend. How many do we have each?



NON-negotiable year group coverage:

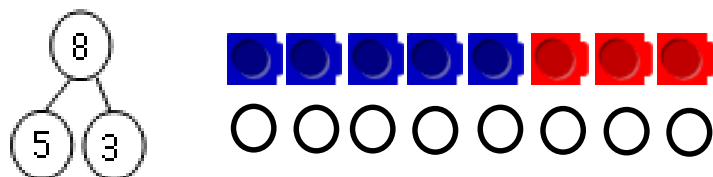
- read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one step problems that involve addition and subtraction, using concrete apparatus and pictorial representations

Addition

Part-part whole circles and concrete apparatus to add.

Children begin with using concrete apparatus to represent a given calculation eg. unifix cubes [0-10] and base ten [11-100]. Once this is secure, children can move on to drawing pictorial representations. Children will combine two sets of objects (aggregation) and move on to adding to a set (augmentation).

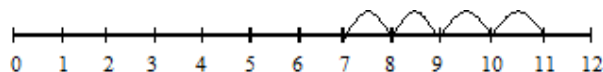
$$5 + 3 = 8$$



Number line to add the smallest number to the greatest number.

(number lines are marked and jumps are made on the top of the number line – number lines start from 0)

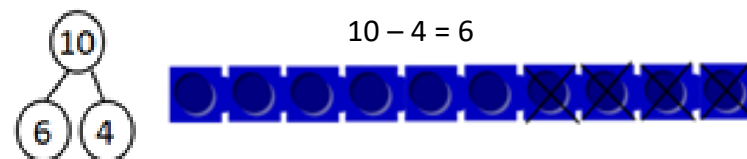
$$7 + 4 = 11$$



Vocabulary: add, and, altogether, more, total, whole number, partition, is the same as/ equal to [equals sign], tens and ones, part-part whole circles, number bonds, how many more to make?

Subtraction

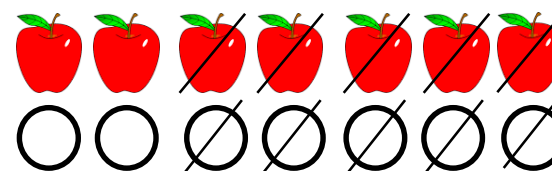
Part-part whole circles and concrete apparatus to subtract.



$$10 - 4 = 6$$

Pictorial representations using crossing out.

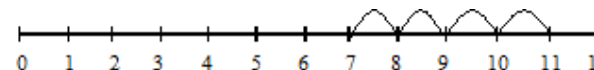
$$7 - 5 = 2$$



Number line to subtract by counting backwards from the greatest number

(when subtracting, backwards jumps are made)

$$11 - 4 = 7$$



Vocabulary: subtract, take away, minus, leave, less, left over, tens and one, how many are left? How many are gone? Find the difference.

Year 1 – Maths Calculation Policy

NON-negotiable year group coverage:

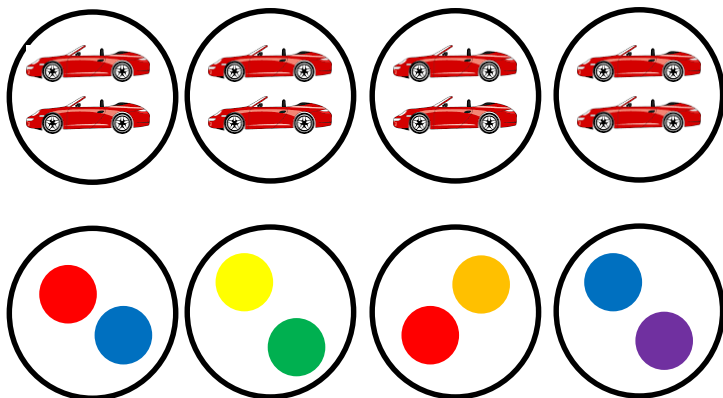
- count in multiples of twos, fives and tens
- show that multiplication of two numbers can be done in any way (commutative) and division of one number can by another cannot
- solve one step problems involving multiplication and division, by calculating the answer using concrete apparatus, pictorial representation and arrays with the support of the teacher

Multiplication

Making equal groups to multiply a one-digit number by 2, 5 and 10.

(children start off with concrete apparatus and pictorial representations and move on to abstract concrete apparatus)

$$4 \times 2 = 8$$



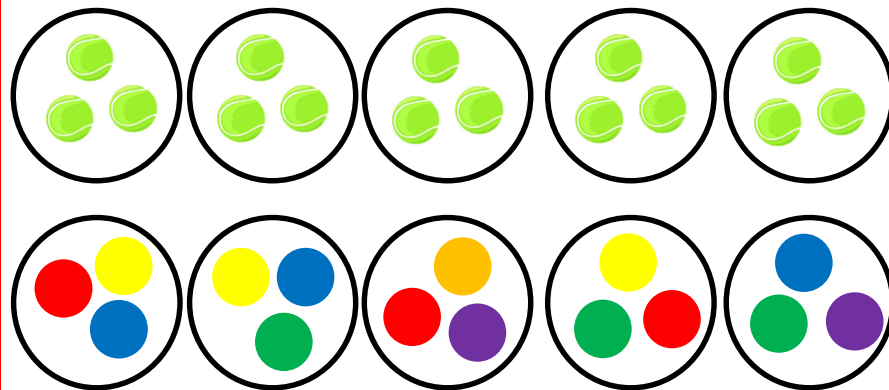
Vocabulary: multiply, multiplication, lots of, groups of, repeat, same size, times, odd/even, repeated addition

Division

Sharing into equal groups to divide by 2, 5 and 10.

(children start off with concrete apparatus and pictorial representations and move on to abstract concrete apparatus)

$$15 \div 5 = 3$$



Vocabulary: Divide, division, share equally, equal groups, fairly, equal, halve, share, one each...two each...three each... etc.

Year 2 – Mental Calculations

Non-negotiable year group coverage:

- number bonds ['story of' up to 12, and pairs with a total of 20]
- add and subtract numbers mentally, including: a two digit number and ones [which includes bridging the tens]; a two digit number and tens; two two digit numbers; adding three one digit numbers
- add and subtract 10 and small multiples of 10 from any given number
- partitioning a number in different ways to support addition and subtraction [taken from Place Value]
- use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100

- count in steps of 2 and 5 starting from zero; count in steps of 10 from any number forwards and backwards
- begin to count in 3s
- begin to learn the 2x 3x, 5x and 10x tables, seeing these as 'lots of' eg. 5 lots of 2
- using fingers, say where a given number is in the 2s, 5s or 10s times tables
- double and half numbers to 20
- begin to double multiples of 5, to 100
- begin to double two-digit numbers less than 50 with ones digits of 1, 2, 3, 4 or 5
- show that multiplication of two numbers can be done in any way (commutative) and division of one number can by another cannot
- relate division to grouping [how many groups of 5 in 15?]

Addition

Using place value

55 + 37 is 50 + 30 and 5 + 7, combining the two totals

$$\begin{array}{|c|c|} \hline 5 & 0 \\ \hline \end{array} + \begin{array}{|c|c|} \hline 3 & 0 \\ \hline \end{array} = 80$$

Counting on

Add multiples of 10 eg. 56 + 30 as 56, 66, 76, 86

Add two-digit numbers by counting on in tens and ones eg. 55 + 37

$$\begin{array}{|c|} \hline 5 \\ \hline \end{array} + \begin{array}{|c|} \hline 7 \\ \hline \end{array} = 9$$

$$= 89$$

Using number facts

Patterns of known facts

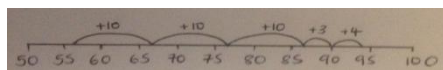
eg. If 6 + 3 = 9 then we know 16 + 3 = 19, 26 + 3 = 29,

Bridging tens

eg. 57 + 5 as 57 + 3 + 2

Adding three single digits by spotting number bonds to 10 or doubles

eg. 6 + 7 + 4 + 2 = 10 + 7 + 2



Subtraction

Using place value

55 - 32 is 50 - 30 and 5 - 2, combining the two totals

$$\begin{array}{|c|c|} \hline 5 & 0 \\ \hline \end{array} - \begin{array}{|c|c|} \hline 3 & 0 \\ \hline \end{array} = 20$$

Taking away

Subtract multiples of 10 eg. 76 - 20 as 76, 66, 56

Subtract two-digit numbers by counting back in tens and ones eg. 67 - 32

$$\begin{array}{|c|} \hline 5 \\ \hline \end{array} - \begin{array}{|c|} \hline 2 \\ \hline \end{array} = 3$$

$$= 23$$

Using number facts

Patterns of known facts

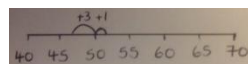
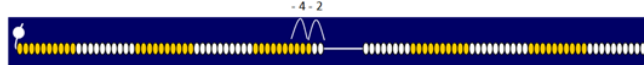
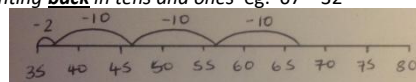
eg. If 9 - 6 = 3 then we know 39 - 6 = 33, 69 - 6 = 63,

Bridging tens

eg. 52 - 6 as 52 - 2 - 4

Counting up

Find a difference between two numbers on a line by counting on eg. 51 - 47

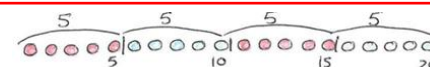


Multiplication

Counting in steps

Count in 2s, 5s and 10s

Begin to count in 3s

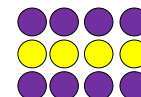


Doubling and halving

Begin to know double of multiples of 5 to 100 eg. double 35 is 70

Grouping

Use arrays to find answers to multiplication and relate to times tables eg. 3 x 4 as three lots of four things and 6 x 5 as counting in fives six times.



Using number facts

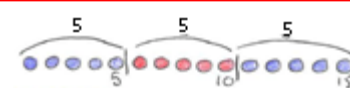
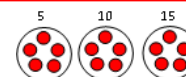
Know doubles to double 20

Start learning 2x, 5x and 10x times tables eg. 2 x 5 = 10, 3 x 5 = 15, 4 x 5 = 20

Division

Counting in steps

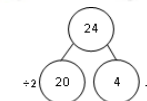
Count in 2s, 5s and 10s



Doubling and halving

Find half of numbers up to 40

Begin to know half of multiples of 10 to 100 eg. half of 70 is 35



Grouping

Relate division to multiplication by using arrays or towers of cubes to find answers to division eg. how many towers of 5 cubes can I make from 20 cubes as $\square \times 5 = 20$ is the same as $20 \div 5 = ?$



Sharing

Find $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of small quantities eg. $\frac{1}{4}$ of 16 cubes by sorting the cubes into 4 piles

Using number facts

Know halves of even numbers to 24

Know 2x, 5x and 10x division facts and begin to know 3x division facts

Year 2 – Maths Calculation Policy

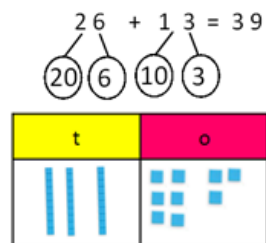
NON-negotiable year group coverage:

- add and subtract numbers using concrete objects and pictorial representations, including: a two digit numbers and ones; a two digit number and tens; two two digit numbers [recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers]
- solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and

Addition

Partitioning numbers in different ways to add two two-digit numbers.

Without exchanging



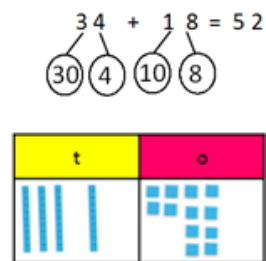
$$6 + 3 = 9$$

$$20 + 10 = 30$$

$$30 + 9 = 39$$

(children must be taught to always start with the ones)

With exchanging



$$4 + 8 = 12$$

$$30 + 10 = 40$$

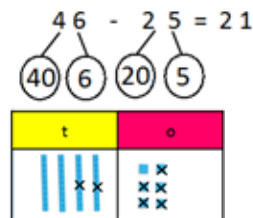
$$40 + 12 = 52$$

Vocabulary: plus, altogether, sum, total, increase, partition, inverse, greatest, smallest, exchange, is the same as/ equal to [equals sign], part part whole circles.

Subtraction

Partitioning numbers in different ways to subtract two-digit numbers from two-digit numbers.

Without exchanging



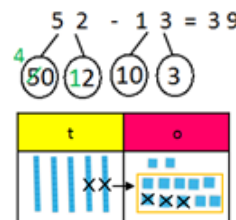
$$6 - 5 = 1$$

$$40 - 20 = 20$$

$$20 + 1 = 21$$

(children must be taught to always start with the ones)

With exchanging



$$12 - 3 = 9$$

$$40 - 10 = 30$$

$$30 + 9 = 39$$

(children make the greatest number and subtract the smallest number)

NB Children will use the part-part whole circles to partition into tens and ones and investigate how numbers can be regrouped.

Vocabulary: subtract, subtraction, minus, less, inverse, decrease, greatest, smallest, difference, fewer than., exchange, part-part whole circles.
Borrowing should not be used as a term because it implies that the borrowed number needs to go back. It is included here as it used to be a common term.

NON-negotiable year group coverage:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs
- solve problems involving multiplications and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts
- recognise and use the inverse relationship between multiplication and division and use this to check calculations and solve missing number problems.

Multiplication

Grouping to multiply within known times tables.

$$3 \times 6 = 18$$



Children can move on to creating arrays to show multiplication. This can be used to show how multiplication and division link.



Division

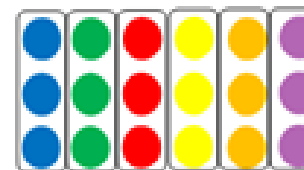
Grouping/sharing to divide within known times tables. Children to use counters as a concrete apparatus and move on to drawing a pictorial representation.

$$18 \div 3 = 6$$

Sharing



Grouping



(ensure that children understand that grouping and sharing produce the same answer)

Vocabulary: lots of, groups of, repeat, times, multiply, multiplied by, multiple of, array, row, column, double.

Vocabulary: sharing, into groups, halve, share, one each... two each... three each etc. divided by, divided onto, left over, how many groups?

Year 3 – Mental Calculations

Non-negotiable year group coverage:

- number bonds ['story of' numbers up to 20]
- number bonds of multiples of 10 with a total of 100
- partitioning a number of different ways to support addition and subtraction [$300 + 8 + 50 = 358$ / $536 - 30 = 506$]
- find 10 or 100 more or less than a given number
- add and subtract numbers mentally, including: a three digit number and ones, a three digit number and tens, a three digit number and hundreds
- subtract two-digit number from numbers >100 by counting up when appropriate
- add and subtract 9 and 11 by adjustment
- add pairs of 'friendly' three-digit numbers [$320 + 450$]
- Use addition and subtraction facts [$9 - 7 = 2$] to derive related facts [$89 - 7 = 82$]
- start with greatest first when adding

- count for 0 in steps of 4, 8, 50 and 100 [*pupils should now know and use multiples of 2, 3, 4, 5, 8, 10, 50 and 100*]
- through doubling, they connect the 2, 4 and 8 multiplication tables
- multiply and divide whole numbers by 10 and 100
- use place value and number facts in mental multiplication and division [20×5 is 15×10 / $84 \div 4$ is half of 42]
- partition teen numbers to multiply by a single digit [3×14 is 3×10 add 3×4]
- show that multiplication of two numbers can be done in any way (commutative) and division of one number can by another cannot
- double numbers up to 50
- halve even numbers to 100, halve odd numbers to 20
- use multiplication and division facts [$3 \times 2 = 6$ so $6 \div 3 = 2$] to derive related facts [$30 \times 2 = 60$ so $60 \div 3 = 20$]

Addition

Using place value

Count in hundreds eg. knowing $475 + 200$ as 475, 575, 675
Add multiples of 10, 100 and £1 eg. $746 + 200$ or $746 + 40$

$68 + 74$ as $60 + 70$ and $8 + 4$, combining the two totals.

Counting on

Add a three-digit and two-digit numbers by adding h, t and o

eg. $125 + 34$ as $100 + 20 + 30 + 5 + 4$

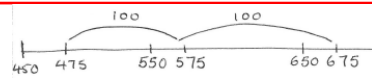
Add near multiples of 10 and 100

eg. $67 + 39$ as $(67 + 40) - 1$

Using number facts

Number bonds to 100 eg. $65 + 35$, $47 + 53$, $71 + 29$ etc.

Adjustment when adding 9 and 11 eg. $27 + 9$ as $(27 + 10) - 1$ or $36 + 11$ as $(36 + 10) + 1$



$$\begin{array}{r} 60 \\ 8 \end{array} + \begin{array}{r} 70 \\ 4 \end{array} = 130 \\ \begin{array}{r} 8 \\ 4 \end{array} = 12 \\ \hline = 142$$

Multiplication

Count in steps – sequences

Count in 2s, 3s, 4s, 5s, 8s and 10s

eg. colour the multiples on a 100 square or jumps on a landmarked number line

Doubling and halving

Find doubles to double 50 using partitioning

Use doubling as a strategy in multiplying by 2 eg. 18×2 is double 18.

Grouping

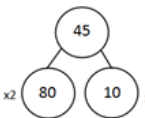
Recognise that multiplying is commutative eg. $8 \times 4 = 4 \times 8$

Multiply multiples of 10 by a single-digit eg. $30 \times 8 = 240$ ($3 \times 8 = 24$)

Multiply friendly two-digit numbers by single digit numbers eg. 13×2

Using number facts

Know 2x, 3x, 4x, 5x, 8x and 10x



Subtraction

Using place value

Count back in hundreds eg. knowing $372 - 200$ as 372, 272, 172

Subtract multiples of 10, 100 and £1 eg. $476 - 40 = 436$ or $436 - 300 = 136$

$348 - 143$ as $300 - 100$, $40 - 40$ and $8 - 3$, combining the three totals.

Counting back

Subtract two three-digit numbers by counting back in h, t and o

eg. $763 - 121$ as $763 - 100 - 20 - 1$

Subtract near multiples of 10 and 100

eg. $648 - 199$ as $(648 - 200) + 1$

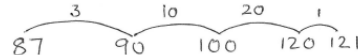
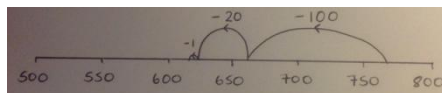
Counting up

Find the difference between two numbers by counting up from the smaller to larger eg. $121 - 87$

Using number facts

Number bonds to 100 eg. $100 - 35 = 65$, $100 - 48 = 52$ etc.

$$\begin{array}{r} 300 \\ 40 \\ 8 \end{array} - \begin{array}{r} 100 \\ 40 \\ 3 \end{array} = 200 \\ \begin{array}{r} 40 \\ 8 \end{array} - \begin{array}{r} 40 \\ 3 \end{array} = 0 \\ \begin{array}{r} 8 \\ 3 \end{array} = 5 \\ \hline = 205$$



Division

Count in steps – sequences

Count in 2s, 3s, 4s, 5s, 8s and 10s

eg. colour the multiples on a 100 sq

Doubling and halving

Find half of even numbers to 100, using partitioning

Use halving as a strategy in dividing by 2 eg. $36 \div 2$ is half of 36

Grouping

Recognise that dividing is not commutative eg. $16 \div 2$ is not equal to $2 \div 16$

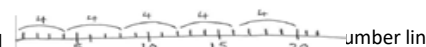
Relate division to multiplication 'with holes in' eg. $\square \times 5 = 30$ is the same as $30 \div 5 = ?$ therefore we can count in 5s to find the answer

Divide multiples of 10 by a single-digit eg. $240 \div 8 = 30$ ($24 \div 8 = 3$)

Using number facts

Know half of even numbers to 40 and of 0 to 200 eg. half of 170 is 85

Know 2x, 3x, 4x, 5x, 8x and 10x division facts



Year 3 – Maths Calculation Policy

NON-negotiable year group coverage:

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

Addition

Compact column addition to add numbers with up to 3 digits.

Without exchanging

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 2 \quad 1 \quad 5 \\ + 1 \quad 3 \quad 2 \\ \hline 3 \quad 4 \quad 7 \end{array}$$

	h	t	o
+			
=	3	4	7

With exchanging

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 2 \quad 8 \quad 7 \\ + 1 \quad 0 \quad 5 \\ \hline 3 \quad 9 \quad 2 \\ \text{1} \end{array}$$

	h	t	o
+			
=	3	9	2

Subtraction

Compact column subtraction to subtract numbers with up to 3 digits.

Without exchanging

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 4 \quad 5 \quad 6 \\ - 1 \quad 3 \quad 1 \\ \hline 3 \quad 2 \quad 5 \end{array}$$

	h	t	o
-			
=	3	2	5

With exchanging

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 3 \quad 6 \quad 3 \\ - 1 \quad 3 \quad 5 \\ \hline 2 \quad 3 \quad 8 \end{array}$$

	h	t	o
-			
=	2	3	8

Vocabulary: Add, addition, plus, and, altogether, more, sum, total, increase, number line, count on, partition, inverse, how many more to make? How many more is ___ than ___? Hundreds, tens, ones, column method.

Vocabulary: subtract, subtraction, take away, less, how many are left/left over? Inverse, decrease, difference, fewer than, more than, hundreds, tens, ones, boundary, how much less is ___ than ___? written method.
Borrowing should not be used as a term because it implies that the borrowed number needs to go back. It is included here as it used to be a common term.

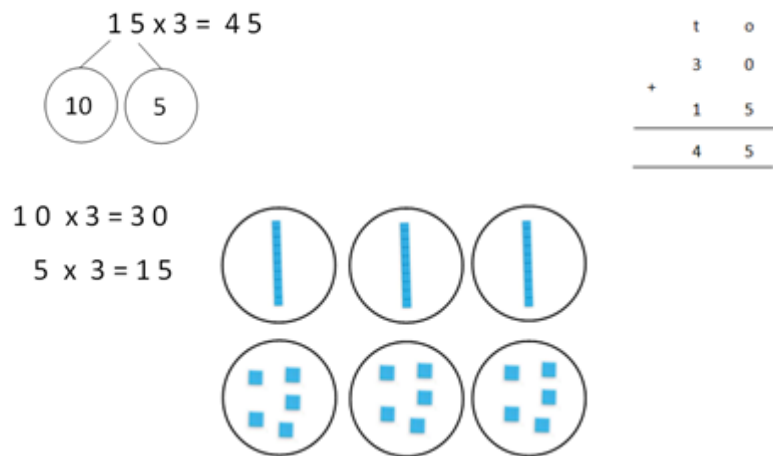
Year 3 – Maths Calculation Policy

NON-negotiable year group coverage:

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

Multiplication

Grouping to multiply by two-digit numbers by one-digit numbers.

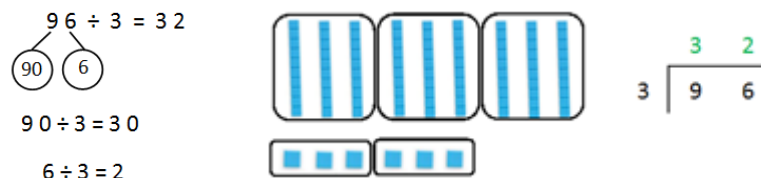


(ensure that children are grouping the tens and ones and that the amount of groups relates to the divider)

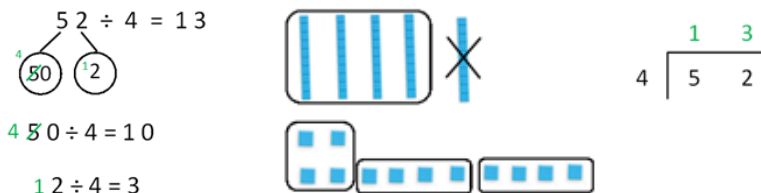
Division

Grouping to divide two-digit numbers by one-digit numbers.

Without regrouping



With regrouping



(ensure that children are grouping and not sharing in order to lead into short division)

NB Children will use the short division as a template to write their answer. They will look at 96 as a whole number rather than digits.

Vocabulary: lots of groups, repeat, times, multiply, multiplied by, multiple of, double, part-part whole circles.

Vocabulary: equal, halve, equal groups of, divided by, divided into, how many groups? regrouping, part-part whole circles.

Year 4 – Mental Calculations

Non-negotiable year group coverage:

- know by heart/quickly derive number bonds to 100 and to £1 [add to the next hundred and pound]
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- round any number to the nearest 10, 100 or 1000
- add and subtract any two-digit numbers by partitioning or counting on
- add and subtract multiples of 10, 100 and 1000 to two-digit and three-digit numbers
- add and subtract £1, 10p and 1p to amounts of money
- derive quickly doubles of multiples of 10 up to 500 eg. $360+360$
- use place value and number facts to add one, two, three and four-digit numbers where a mental calculation is appropriate
- subtract by counting up

- count from 0 in steps of 6, 7, 9, 25 and 1000 [*children should know by heart all the multiplication facts up to 12×12*]
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; multiplying by 10 and 100; dividing by 1; multiplying together three numbers
- multiply multiples of 10, 100, 1000 by single digit numbers [300×6 or 4000×8]
- use distributive law to multiply larger numbers [36×5 could be 30×5 and 6×5]
- adjustment by spotting 'nearly' numbers eg 6×19 is nearly 6×20
- recognise factors up to 12 of two-digit numbers.
- use understanding of place value and number facts in mental multiplication [36×5 is half of 36×10 and $50 \times 60 = 3000$]
- partition 2-digit numbers to multiply by a single-digit number mentally [4×24 as 4×20 and 4×4]
- multiply near multiples using rounding [33×19 as $33 \times 20 - 33$]
- find doubles to double 100 and beyond using partitioning
- begin to double amounts of money [$£35.60$ doubled = $£71.20$]
- show that multiplication of two numbers can be done in any way (commutative) and division of one number can by another cannot

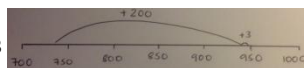
Addition

Using place value

Count in thousands eg. knowing $1475+2000$ as 1475, 2475, 3475

Add multiples of 10, 100 and £1 eg. $746+200$ or $746+40$

Partitioning eg. $746 + 203$ as $700 + 200$ and $46 + 3$ or $746 + 200 + 3$



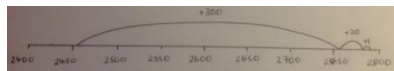
Counting on

Add a three-digit and four-digit numbers by adding th, h, t and o

eg. $2452 + 321$ as $2452 + 300 + 20 + 1$

Add near multiples of 10, 100 and 1000

eg. $3462 + 2999$ as $(3462 + 3000) - 1$



Using number facts

Number bonds to 100 and to the next multiple of 100 eg. $1353 + 47$

Adjustment when adding 9 and 11 eg. $27 + 9$ as $(27 + 10) - 1$ or $36 + 11$ as $(36 + 10) + 1$

Subtraction

Using place value

Count back in thousands eg. $4378-3000$ as 4378, 3378, 2378, 1378

Take away multiples of 10, 100, 1000 and £1 eg. $8392-50$ or $6723-3000$

Partitioning eg. $£5.87 - £3.04$ as $£5 - £3$ and $7p - 4p$ or $7493 - 2020$ as $7000-2000$ and $90-20$

Counting back

Count back eg. $6482 - 1301$ as $6482 - 1000$ then $- 300$ then $- 1$

Subtract near multiples of 10, 100 and 1000 eg. $3522 - 1999$ as $(3522 - 2000) + 1$

Counting up

Find a larger difference between two numbers by counting up from the smaller number to the larger number eg. $1506 - 387$



Using number facts

Number bonds to 100 and to the next multiple of 100 eg. $100-76 = 24$

Adjustment when adding 9 and 11 eg. $27 - 9$ as $(27 - 10) + 1$ or $36 - 11$ as $(36 - 10) - 1$

Multiplication

Count in steps – sequences

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s



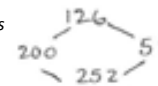
Doubling and halving

Find doubles to double 100 and beyond using partitioning, using derived facts

Begin to double amounts of money eg. $£3.50$ doubled is $£7$

Use doubling as a strategy in multiplying by 2, 4 and 8

eg. 34×4 is double 34 and double again.



Grouping

Use partitioning to multiply two-digit numbers by single-digit numbers

Multiply multiples of 100 by single-digit numbers using table facts eg. $400 \times 8 = 3200$ ($4 \times 8 = 32$)

Multiply using near multiples by rounding eg. 24×19 as $(24 \times 20) = 480$

Using number facts

Know times tables up to 12×12

Division

Count in steps – sequences

Count in 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s, 100s and 1000s



Doubling and halving

Find halves of even numbers to 200 and beyond using partitioning, using derived facts

Begin to halve amounts of money eg. $£9$ halved is $£4.50$

Use halving as a strategy in dividing by 2, 4 and 8

eg. $164 \div 4$ is half of 164 and halved again.



Grouping

Use multiples of 10 times the divisor to divide by numbers <10 eg. $45 \div 3$ as $30 \div 3$ and $15 \div 3$

Divide multiples of 100 by single digits numbers using division facts eg. $3200 \div 8 = 400$

Using number facts

Know times tables up to 12×12 and all related division facts

Use division facts to find unit and non-unit fractions of amounts

Year 4 – Maths Calculation Policy

NON-negotiable year group coverage:

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

Addition

Compact column addition to add numbers with up to 4 digits.

Without exchanging

	th	h	t	o
	2	4	3	7
+		3	4	2
	2	7	7	9

	th	h	t	o
	●●	●●●●	●●●●	●●●●
+			●●●●	●●●●
		●●●●	●●●●	●●●●
=	2	7	7	9

With exchanging

	th	h	t	o
	3	1	2	5
+	1	2	3	6
	4	3	6	1

	th	h	t	o
	●●●	●●	●●●●	●●●●
+	●●		●●●●	●●●●
		●●●●	●●●●	●●●●
=	2	3	6	9

Subtraction

Compact column subtraction to subtract numbers with up to 4 digits.

Without exchanging (crossing out)

	th	h	t	o
	2	6	9	3
-		2	5	2
	2	4	4	1

	th	h	t	o
	●●	●●●●	●●●●	●●●●
-		●●●●	●●●●	●●●●
		●●●●	●●●●	●●●●
=	2	4	4	1

With exchanging

	th	h	t	o
	2	6	4	5
-	1	4	2	7
	1	2	2	5

	th	h	t	o
	●●	●●●●	●●●●	●●●●
-	●●	●●●●	●●●●	●●●●
		●●●●	●●●●	●●●●
=	1	2	2	5

Vocabulary: add, addition, plus, make, more, sum, total, increase, inverse, altogether, how many more to make __? How many more is __ than __? partition, thousands, hundreds, tens, ones, count on, exchange, column method.

Vocabulary: subtract, subtraction take away, minus, decrease, leave, how many are left/left over? More than, fewer than, difference, tens/hundreds boundary, how much more/less is __?, inverse, column method.

Borrowing should not be used as a term because it implies that the borrowed number needs to go back.

Year 4 – Maths Calculation Policy

NON-negotiable year group coverage:

- recall multiplication and division facts for multiplication tables up to 12×12
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- divide a three-digit number by a one-digit number
- estimate and use inverse operations to check answers to a calculation
- solve problems involving multiplying and dividing, including the distributive law to multiply a two digit number by a one digit number, integer scaling problems and harder correspondence problems such as n objects are connecting to m objects

Multiplication

Expanded short multiplication of a two-digit number by single digit numbers.

$34 \times 3 =$

h t o

 3 4

x 3

 1 2

 9 0

1 0 2

1

(4 x 3)

(30 x 3)

(children could use concrete counters or draw working out as a pictorial representation)

Division

Short division of 2-digit and 3-digit number by single digit numbers.

Without regrouping

$$\begin{array}{r} 2 \quad 1 \quad 3 \\ 3 \overline{) 639} \end{array}$$

(ensure are children are grouping not sharing)

With regrouping

$$\begin{array}{r} 1 \quad 2 \quad 3 \\ 5 \overline{) 615} \end{array}$$

(children could use concrete counters or draw working out as a pictorial representation)

NB Children can be exposed to remainders at this stage but it should not act as a specific teaching point until Year 5.

Vocabulary: lots of, groups, repeat, times, multiply, steps of, multiplied by, multiple of, double, product, expanded short multiplication.

Vocabulary: sharing, share equally, into groups, equal, divided by, divided into, left over, remainder, how many groups, divisible by, how many ___ go into ___? inverse, quotient, divider, short division, regrouping

Year 5 – Mental Calculations

Non-negotiable year group coverage:

- add and subtract numbers mentally with increasingly large numbers
- know numbers bonds to 1 and to the next whole number
- add to the next 10 from a decimal number, e.g. $13.6 + 6.4 = 20$
- add and subtract numbers with two significant digits only, using mental strategies [$3.4 + 4.8$ or $23,000 + 47,000$ / $6.2 - 4.5$ or $72,000 - 47,000$]
- add and subtract one or two-digit multiples of 10, 100, 1000, 10,000 and 100,000 [$8000 + 7000$ or $600,000 + 700,000$ / $8000 - 3000$ or $600,000 - 200,000$]
- add and subtract near multiples of 10, 100, 1000, 10,000 and 100,000 to other numbers [$82,472 + / - 30,004$]
- add and subtract decimal numbers which are near multiples of 1 or 10, including money [$6.34 + / - 1.99$ or $£34.59 + / - £19.95$]
- use counting up subtraction with knowledge of number bonds to 10/100 or £1 [$£10 - £3.45$]
- use place value and number facts to add two or more friendly numbers including money and decimals. [$3 + 8 + 6 + 4 + 7$, $0.6 + 0.7 + 0.4$, or $2,056 + 44$]

- know by heart all of the multiplication and division facts up to 12×12
- multiply and divide whole numbers and those involving decimals by 10, 100, 1000 and 10,000
- recognise and use square numbers and cube numbers, and the notation for squared and cubed
- use doubling and halving as mental multiplication and division strategies [58×5 is equal to $(58 \times 10) \div 2$ / $34 \div 5$ is equal to $(34 \div 10) \times 2$]
- identify and use knowledge of multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- use partitioning to double and halve, including money
- partition two-digit numbers, including decimals, to multiply by a single-digit number mentally [6×27 as $6 \times 20 + 6 \times 7$ / 6.3×7 as $6 \times 7 + 0.3 \times 7$]
- divide larger numbers mentally by subtracting the 10^{th} and 100^{th} multiple as appropriate [$96 \div 10$ is $10 \times 6 = 60$ and $6 \times 6 = 36$]
- use common factors to simplify fractions; use common multiples to express fractions in the same denomination

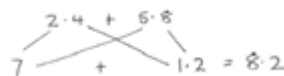
Addition

Using place value

Count in steps of 10, 100, 1000, 0.1s, 0.01s from any given number.

Partitioning eg. $7348 + 2187$ as $7348 + 2000 + 100 + 80 + 7$ or

$2.4 + 5.8$ as $2 + 5$, $0.4 + 0.8$ and combine the totals together.



Counting on

Count on from the greatest number eg. $6834 + 3005$ as $9834 + 5$

Add near multiples eg. $82,472 + 30,004$ as $(82,472 + 30,000) + 4$

Add two decimal numbers by adding the o then ths then hths

eg. $5.72 + 3.05$ as $5.72 + 3 + 0.5$

Using number facts

Know number bonds to 1 and to the next whole number eg. $0.4 + 0.6$ or $5.7 + 0.3$

Add to the next 10 from a decimal number eg. $7.8 + 2.2 = 10$

Subtraction

Taking away

Use place value to subtract decimals eg. $4.58 - 0.08$ or $6.26 - 0.2$ etc.

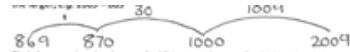
Take away multiples of power of 10 eg. $15,672 - 300$ or $4.82 - 2$

Partition or count back eg. $3964 - 1051$ or $5.72 - 2.01$

Subtract near multiples eg. $86,456 - 9999$ or $3.58 - 1.99$

Counting up

Find a difference between two numbers by counting up from the smaller to the greater number eg. $2009 - 869$



Find change using shopkeepers' addition

eg. buy toy for $£6.89$ using $£10$



Using number facts

Derived facts from number bonds to 10 and 100 eg. $2 - 0.45$ using $45 + 55 = 100$

Number bonds to £1, £10 and £100 eg. $£4.00 - £3.86 = 14p$

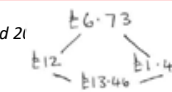
Multiplication

Doubling and halving

Use double and halving strategies when multiplying by 2, 4, 8, 5 and 20

Double amounts of money using partitioning eg. $£6.73$ doubled is

double $£6$ plus double $73p$



Grouping

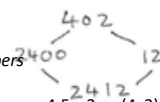
Multiply decimals by 10, 100 and 1000 eg. $3.4 \times 100 = 340$

Use partitioning to multiply friendly two-digit and three-digit numbers

by single digits eg. 402×6 as $(400 \times 6) + (2 \times 6)$

Use partitioning to multiply decimal numbers by single digit numbers eg. 4.5×3 as $(4 \times 3) + (0.5 \times 3)$

Multiply using near multiples by rounding eg. 32×29 as $(32 \times 30) - 32$



Using number facts

Use times tables facts up to 12×12 to multiply multiples of the multiplier eg. $6 \times 4 = 24$ so $60 \times 4 = 240$ and

$600 \times 4 = 2400$

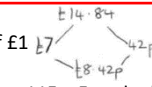
Know square numbers and cube numbers

Division

Doubling and halving

Halve amounts of money using partitioning eg. half of $£14.84$ is half of $£14$ and half of $84p$

Use doubling and halving as a strategy in dividing by 2, 4, 8, 5 and 20 eg. $115 \div 5$ as double $115 \div 10$



Grouping

Divide numbers by 10, 100, 1000 to obtain decimal answers with up to three places eg. $340 \div 100 = 3.4$

Use 10^{th} , 20^{th} , 30^{th} multiples of the divisor to divide friendly two-digit and three-digit numbers

eg. $186 \div 6$ as $180 \div 6$ plus $6 \div 6$

Find unit and non-unit fractions of large amounts eg. $3/5$ of 265 is $3 \times (265 \div 5)$

Using number facts

Use division facts up to 12×12 to divide numbers by single-digit numbers eg. $3600 \div 9$ as $36 \div 9$

Know square numbers and cube numbers

Year 5 – Maths Calculation Policy

NON-negotiable year group coverage:

- add and subtract whole numbers within a million, including using formal written methods (columnar addition and subtraction)
- add and subtract decimal numbers, including amounts of money
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Addition

Estimate answer by rounding prior to written strategy.

$$52,894 + 39,515 \rightarrow 50,000 + 40,000 \rightarrow 90,000 \text{ (see answer below)}$$

Compact column addition to add numbers with up to 5 digits.

$$\begin{array}{r} 52894 \\ + 39515 \\ \hline 92409 \end{array}$$

1 1 1

Compact column addition to add decimal numbers.

	t	o	ths	hths
	5	2	• 1	5
+	2	9	• 5	7
	8	1	• 7	2
	1			1

NB The use of concrete apparatus can be used as a scaffold for ALL children (see Year 4)

Vocabulary: add, addition, plus, make, more, sum, total, increase, partition, column boundary, exchange, decimal

Subtraction

Estimate answer by rounding prior to written strategy.

$$67,792 - 48,253 \rightarrow 70,000 - 50,000 \rightarrow 20,000 \text{ (see answer below)}$$

Compact column subtraction to subtract numbers with up to 5 digits.

$$\begin{array}{r} 67792 \\ - 48253 \\ \hline 19539 \end{array}$$

Compact column subtraction to subtract decimal numbers.

	t	o	ths	hths
	6	7	• 7	9
-	4	8	• 2	5
	2	7	• 0	9

NB The use of concrete apparatus can be used as a scaffold for ALL children (see Year 4)

Vocabulary: subtract, subtraction, take away, minus, difference, decrease, exchange, decimal

NON-negotiable year group coverage:

- 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
- 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
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Multiplication

Compact short multiplication of a four-digit number by a one digit number.

$$\begin{array}{r}
 2 4 0 3 \\
 \times 6 \\
 \hline
 1 4 4 1 8 \\
 2 1
 \end{array}$$

Long multiplication of a four-digit number by a two-digit number.

$$\begin{array}{r}
 2 8 9 4 \\
 \times 1 5 \\
 \hline
 1 4 4 7 0 \quad (2894 \times 5) \\
 2 8 9 4 0 \quad (2894 \times 10) \\
 \hline
 4 3 4 1 0 \\
 1 1 1
 \end{array}$$

(Please note the placement of the digits when the column boundary is crossed. Use of different colours is a useful strategy.)

NB Expanded short multiplication provides a scaffold for ALL children.

Vocabulary: lots of, groups, times, multiply, multiplied by, multiple of, product, short multiplication, long multiplication.

Division

Short division of a four-digit number by a one-digit number, using remainders when necessary

$$\begin{array}{r}
 5 6 7 \\
 9 \overline{) 5 1 0 3}
 \end{array}$$

$$\begin{array}{r}
 1 6 9 4 r2 \\
 5 \overline{) 8 4 7 2}
 \end{array}$$

NB The use of concrete apparatus can be used as a scaffold for ALL children (see Year 4)

Vocabulary: sharing, share equally, into groups, divided by, divided into, left over, remainder, how many groups, factor, divisible by, divisibility, inverse, quotient.

Year 6 – Mental Calculations

Non-negotiable year group coverage:

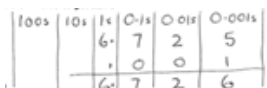
- perform mental calculations, including with mixed operations and large numbers
- know by heart all number bonds to 100 and use these to derive related facts [$3.46 + 0.54 = 4$]
- use number bonds to 100 to support subtraction through complementary addition [$1000 - 654$ as $46 + 300$] and quickly derive bonds to 1000
- add small and large whole numbers, using place value [$34,000 + 8000$]
- add negative numbers in context such as temperature
- add two one-place decimal numbers or two-place decimal numbers less than 1 [$4.5 + 6.3$ or $0.24 + 0.33$]
- use number bonds to 1 and 10 to mentally subtract any pair of one-place or two-place decimal numbers using complementary addition [$10 - 3.65$ as $0.35 + 6$]
- use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to two places [$467,900 - 3,005$ or $4.63 - 1.02$]
- add and subtract positive and negative numbers [calculate rise in temperature or continue a sequence]
- identify common factors, common multiples and prime numbers and use factors in mental multiplication [326×6 is 652×3] and division [$438 \div 6$ is $219 \div 3$]
- use place value and number facts as mental strategies [$40,00 \times 6 = 240,000$ or $0.03 \times 6 = 0.18$]
- use tests for divisibility to aid mental calculations
- use doubling and halving to multiply and divide by 2, 4, 8, 5, 20, 50 and 25 [28×25 is $\frac{1}{4}$ of 28×100]
- use rounding to support mental multiplication [34×19 is $(34 \times 20) - 34$]
- multiply and divide one and two-place decimal numbers up to and including 10 using place value and partitioning [3.6×4 is $12 + 2.4$ / $2.4 \div 6$ is $(24 \div 6) \div 10$]
- double and halve decimal numbers with up to two places using partitioning [36.73×2 is double 36 plus double 0.73 / half of 36.86 is half of 36 plus half of 86]
- know and use equivalence between simple fractions, decimals and percentages, including in different contexts
- recognise a given ratio and reduce it to its lowest terms

Addition

Using place value

Count in 0.1s, 0.01s, and 0.001s eg. knowing what 0.001 more than 6.725 is

Partitioning eg. $9.54 + 3.25$ as $9 + 3$ and $0.5 + 0.2$ and $0.04 + 0.05$ to get 12.79



Counting on

Add two decimal numbers by adding the o then ths then hths or tths

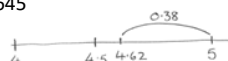
eg. $6.31 + 3.46$ as $6.31 + 3 + 0.4 + 0.06$

Add near multiples to 1 and 10 eg. $6.75 + 9.95$ as $(6.75 + 10) - 0.05$ or $6.35 + 0.99$ as $(6.35 + 1) - 0.01$

Using number facts

Number bonds to 1 and to the next multiple of 1 eg. $0.63 + 0.37$ or $2.35 + 0.645$

Add to the next ten eg. $4.62 + 0.38$

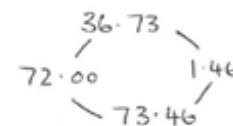


Multiplication

Doubling and halving

Use doubling and halving as strategies in mental multiplication.

Double decimal numbers with up to 2 places using partitioning eg. 36.73 doubled is double 36 (72) plus double 0.73 (1.46)



Grouping

Use partitioning as appropriate eg. 3060×4 as $(3000 \times 4) + (60 \times 4)$ or 8.4×8 as $(8 \times 8) + (0.4 \times 8)$

Use factors in mental multiplication eg. 421×6 as 421×3 and doubled or 3.42×5 is half of 3.42×10

Multiply decimal numbers using near multiples by rounding eg. 4.3×19 as $(4.3 \times 20) - 4.3$

Using number facts

Use times tables facts up to 12×12 in mental multiplication of large numbers or numbers with up to two-decimal places eg. $6 \times 4 = 24$ so $0.06 \times 4 = 0.24$

Subtraction

Taking away

Use place value to subtract decimal numbers eg. $7.78 - 0.08$ or $16.26 - 0.2$ etc

Take away multiples of power of 10 eg. $123,956 - 400$, $686,109 - 40,000$ or $7.82 - 0.5$

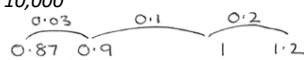
Partition or count back eg. $3964 - 1051$ or $5.72 - 2.01$

Subtract near multiples eg. $360,078 - 99,998$ or $12.83 - 0.99$

Counting up

Count up to subtract numbers from multiples of 10, 100, 1000, 10,000

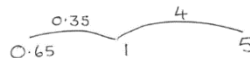
Find a difference between two decimal numbers by counting up from the smaller the greater number eg. $1.2 - 0.87$



Using number facts

Derive facts from number bonds to 10 and 100 eg. $5 - 0.65$

Number bonds to £1, £10 and £100 eg. $£7.00 - £4.37$

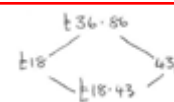


Division

Doubling and halving

Use doubling and halving as strategies in mental division.

Halve decimal numbers with up to two-places using partitioning eg. half of 38.86 is half of 38 plus half of 0.86.



Grouping

Use 10^{th} , 20^{th} , 30^{th} ... 100^{th} , 200^{th} etc. multiples of the divisor to divide larger numbers eg. $378 \div 9$ as $360 \div 9$ and $18 \div 9$.

Use tests for divisibility eg. 135 divides by 3 as $1+3+5 = 9$ and 9 is in the 3x tables.

Using number facts

Use division facts up to 12×12 to divide decimal numbers by single-digit numbers eg. $1.17 \div 3$ $\frac{1}{100}$ of $117 \div 3$ (0.39)

Year 6 – Maths Calculation Policy

NON-negotiable year group coverage:

- use their knowledge of the order of operations to carry out calculations involving the four operations
- use column addition to add and subtract numbers with up to 6 digits
- use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve problems involving addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Addition

Estimate by calculating prior to written strategy.

$$328,751 + 123,595 \rightarrow 300,000 + 100,000 \rightarrow 400,000 \text{ (see answer below)}$$

Compact column addition to add numbers with up to 6 digits.

$$\begin{array}{r}
 328751 \\
 + 123595 \\
 \hline
 452346 \\
 \hline
 \end{array}$$

1 1 1

Compact column addition to add decimal numbers with up to 2 places.

$$\begin{array}{r}
 14.95 \\
 + 12.35 \\
 \hline
 27.30 \\
 \hline
 \end{array}$$

1 1

NB Expanded column addition provides a scaffold for ALL children.

Vocabulary: add, addition, sum, total, increase, inverse, altogether, compact column addition, column boundary

Subtraction

Estimate by calculating prior to written strategy.

$$328,751 + 123,595 \quad 300,000 + 100,000 \quad 400,000 \text{ (see answer below)}$$

Column subtraction to subtract numbers with up to 6 digits.

$$\begin{array}{r}
 582431 \\
 - 142735 \\
 \hline
 440706 \\
 \hline
 \end{array}$$

Compact column subtraction to subtract decimal numbers with up to 2 places.

$$\begin{array}{r}
 36.92 \\
 - 25.35 \\
 \hline
 11.57 \\
 \hline
 \end{array}$$

NB Expanded column subtraction provides a scaffold for ALL children.

Vocabulary: subtract, subtraction, minus, decrease, leave, difference, column boundary

Year 6 – Maths Calculation Policy

NON-negotiable year group coverage:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context
- 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
- use their knowledge of the order of operations to carry out calculations involving the four operations
- use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve problems involving multiplication and division

Multiplication

Division

Estimate by calculating prior to written strategy.

$$5586 \times 12 \longrightarrow 6000 \times 10 \longrightarrow 60,000 \text{ (see answer below)}$$

Long multiplication of a 4-digit number by a two-digit number.

	5	5	8	6	
x				1	2
	1	1		1	
	1	1	1	7	2
	5	5	8	6	0
	6	7	0	3	2
	1	1			

		4	7	6	
x				2	3
			2	1	
	1	1	4	2	8
	9	5	2	0	
	1	0	9	4	8

(Please note the placement of the digits when the column boundary is crossed. Use of different colours is a useful strategy.)

Short division of 3-digit and 4-digit number by single digit numbers, and 2-digit where applicable.

	1	2	6	4	
6		7	¹ 5	³ 8	² 4

	0	4	5	r1	
11		4	⁵ 9	6	

(11 into 4 = 0
 11 into 49 = 4 with 5 left over
 11 into 56 = 5 remainder 1)

Long division of 3-digit and 4-digit divided by 2-digit number.

Example 1

	0	1	0	3	
32		3	2	9	6
-		3	2		
		0	0	9	6
-				9	6
				0	0

Example 2

	0	2	8	r12
15		4	3	2
-		3	0	
		1	3	2
-		1	2	0
		0	1	2

(the remainder can
be interpreted as
 $\frac{12}{15} \rightarrow \frac{4}{5}$ or 0.8)

Vocabulary: lots of, groups of, repeat, times, multiply, multiplied by, multiple of, factor, prime number, product, short multiplication, long multiplication.

Vocabulary: divided by, divided into, left over, remainder, how many groups, factor, divisible by, divisibility, inverse, divider, dividend, quotient, short division, long division.

Glossary

2-digit number – a number with 2 digits like 23, 45, 12 or 60

3-digit number – a number with 3 digits like 123, 542, 903 or 561

Addition facts – knowing that $1+1 = 2$ and $1+3 = 4$ and $2+5 = 7$. Normally we only talk about number facts with totals of 20 and under.

Array - An array is an arrangement of a set of numbers or objects in rows and columns –it is mostly used to show how you can group objects for repeated addition or subtraction.

Bead String/Bar – a string with (usually 100) beads on, grouped by colour in tens. The bead string is a good bridge between a number track and a number line as it maintains the cardinality of the numbers whilst beginning to develop the concepts of counting ‘spaces’ rather than objects.

Bridging – when a calculation causes you to cross a ‘ten boundary’ or a ‘hundred boundary’ e.g. $85 + 18$ will bridge 100.

Compact vertical – the name of the recommended written method for addition whereby the numbers are added in columns, 1s first then 10s and so on. Where the total exceeds 10, the ten 1s are exchanged for a 10 and written below the answer line. Sometimes referred to as ‘carrying’.

Concrete apparatus – objects to help children count and calculate– these are most often cubes (multilink) but can be anything they can hold and move including Cuisenaire rods, Dienes rods (hundreds, tens and units blocks), straws, Numicon, Place Value counters and much more.

Count all – when you add by counting all the items/objects e.g. to add 11 and 5 you would count out 11, then count out 5, then put them together and count them all to get 16.

Count on – when you add (or sometimes subtract) by counting onwards from a given number. E.g. to add 11 and 5 you would count on 5 from 11 i.e. 12, 13, 14, 15, 16

Decimal number – a number with a decimal point e.g. 2.34 (said as two point three four)

Decomposition – the name of the recommended written method for subtraction whereby the smaller number is subtracted from the larger, 1s first then 10s and so on. Where the subtraction cannot be completed as the second number is larger than the first, a 10 is exchanged for ten 1s to facilitate this. This is the traditional ‘borrowing’ form of column method, which is different to the ‘payback’ method.

Dienes Rods (or Base 10) – this is a set of practical equipment that represents the numbers to help children with place value and calculation. The Dienes rods show 1s, 10s, 100s and 1000s as blocks of cubes that children can then combine. Dienes rods do not break up so the child has to ‘exchange’ them for smaller or larger blocks where necessary.

Difference – the gap between numbers that is found by subtraction e.g. $7-5$ can be read as ‘7 take away 5’ or as the ‘difference between 7 and 5’

Dividend – the number being divided in a calculation

Divisor – the smaller number in a division calculation.

Double – multiply a number by 2

Efficient Methods – the method(s) that will solve the calculation most rapidly and easily

Equals - is worth the same as (be careful not to emphasise the use of $=$ to show the answer)

Exchanging – Swapping a ‘10’ for ten ‘1s’ or a ‘100’ for ten ‘10s’ or vice versa (used in addition and subtraction when ‘moving’ ‘ten’ or a ‘hundred’ from its column into the next column and splitting it up). Heavily relied upon for addition and subtraction of larger numbers. Skills in this can be built up practically with objects, then Dienes rods/base 10, then place value counters before relying on a solely written method.

Expanded Multiplication – a method for multiplication where each stage is written down and then added up at the end in a column

Factor – a number that divides exactly into another number, without remainder

Grid method – a method for multiplying two numbers together involving partitioning and multiplying each piece separately.

Grouping – an approach to division where the dividend is split into groups of the size of the divisor and the number of groups created are then counted.

Half - a number, shape or quantity divided into 2 equal parts

Glossary continued

Halve – divide a number by 2

Integer - a whole number (i.e. one with no decimal point)

Inverse – the opposite operation. For example, addition is the inverse of subtraction and multiplication is the inverse of division.

Known Multiplication Facts – times tables and other number facts that can be recalled quickly to support with larger or related calculations e.g. if you know 4×7 then you also know 40×7 , 4×0.7 etc.

Long Division – formal written of division where the remainders are calculated in writing each time (extended version of short division)

Long Multiplication – formal written method of column multiplication

Multiple - a number which is an exact product of another number i.e. a number which is in the times table of another number

Number bonds – 2 numbers that add together to make a given total, e.g. 8 and 2 bond to 10 or 73 and 27 bond to 100

Number line – a line either with numbers or without (a blank numberline).

The number line emphasises the continuous nature of numbers and the existence of ‘in-between’ numbers that are not whole. It is based around the gaps between numbers.

Children use this tool to help them count on or count back for addition or subtraction. As they get older, children will count in ‘jumps’ on a number line e.g. to add 142 to a number they may ‘jump’ 100 and then 40 and then 2. The number line is sometimes used in multiplication and division but can be time consuming.

Number track – a sequence of numbers, each inside its own square. It is a simplified version of the number line that emphasises the whole numbers.

Numicon – practical maths equipment that teaches children the names and values of numbers 1-10 initially but then helps them with early addition, subtraction, multiplication and division. Numicon is useful for showing the real value of a number practically.

One-Step Calculation – a calculation involving only one operation e.g. addition. Usually the child must decide what that operation is.

Partition – split up a larger number into parts, such as the hundreds, tens and units e.g. 342 can be partitioned into 300 and 40 and 2

Place Value – the value of a digit created by its position in a number e.g. 3 represents thirty in 234 but three thousand in 3567

Recombine – for addition, once you have partitioned numbers into hundreds, tens and units then you have to add the hundreds together, then add the tens to that total, then add the units to that total

Remainder – a whole number left over after a division calculation

Repeated addition – repeatedly adding groups of the same size for multiplication

Scaling – an approach to multiplication whereby the number is ‘scaled up’ by a factor of the multiplier e.g. 4×3 means 4 scaled up by a factor of 3.

Sharing – an approach to division whereby the dividend is shared out into a given number of groups (like dealing cards)

Short Division - traditional method for division with a single digit divisor (this is a compact version of long division, sometimes called ‘bus stop’)

Significant digit – the digit in a number with the largest value e.g. in 34 the most significant digit is the 3, as it has a value of ‘30’ and the ‘4’ only has a value of ‘4’

Single digit – a number with only one digit. These are always less than 10.

Sum – the total of two or more numbers (it implies addition). Sum should not be used as a synonym for calculation.

Two-step calculation - a calculation where two different operations must be applied e.g. to find change in a shop you will usually have to add the individual prices and then subtract from the total amount. Usually the child has to decide what these two operations are and the order in which they should be applied.

Equals - is worth the same as (be careful not to emphasise the use of = to show the answer)

Useful links

Web Links

Interactive five frame - <http://www.fuelthebrain.com/games/number-flash/>

Interactive ten frame - <http://www.fuelthebrain.com/games/number-flash/>

ITPs - http://www.taw.org.uk/lic/itp/num_grid.html

100 SPLAT square - <http://www.primarygames.co.uk/pg2/splat/splatsq100.html>

The National Strategies: Teaching children to calculate mentally -

<http://dera.ioe.ac.uk/778/1/735bbb0036bed2dcdb32de11c7435b55.pdf>

Woodlands maths games - <http://www.woodlandgrange.leics.sch.uk/iwb/KS1%20Mathematics.htm>