

# Our Calculation Policy

This calculation policy has been created to meet the expectations of the National Curriculum 2014, but most importantly the learning needs of our children at Dane Bank. The methods chosen match the national curriculum but have also been specifically selected after consideration of our children's learning styles. This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added. It is a working document and will be revised and amended as necessary.

## Age Expectations

The policy has been organised by year group, considering the National Curriculum 2014 expectations. The new curriculum focuses on skills and mastery and is not about moving children on to the next method as soon as they can do the one before. Working and more complex and richer problems rather than new methods will support this 'mastering' of maths. However, some children will be working at

levels well above their age and will require the introduction of new methods.

## Mental Methods

The written methods in this document are important but they by no means replace the superb mental methods we have developed. As children become more mature and confident with their calculation, they need to start following these 4 steps when approaching problems:



## Contents

- 1. EYFS Y6 calculation policy for addition, with examples of CPA
- 2. EYFS Y6 calculation policy for subtraction, with examples of CPA
- 3. EYFS Y6 calculation policy for multiplication, with examples of CPA
- 4. EYFS Y6 calculation policy for division with examples of CPA
- 5. Glossary of mathematical vocabulary



Although this policy sets out the main methods of mental and written calculations to be taught, it has been appended with a list of documents and resources which contain effective practice teaching ideas aimed at informing and enhancing teaching across all the primary phases. These are intended to sit alongside the school's calculation policy, and for teachers to use in conjunction with the policy.

- 1. NCETM's Mastery Booklets (Y1-6)
- 2. NCETM's Professional development material
- 3. NCETM's Calculation Guidance document (published October 2015)
- 4. White Rose Maths' Schemes of Learning (2017 onwards)
- 5. Numicon Handbooks
- 6. Dane Bank Primary School KIRFs
- 7. GLOW Maths Hub "Enabling Environments" (EYFS)
- 8. GLOW Maths Hub Mastery Scheme of Work
- 9. Fractions calculation guidance (Manor Green Primary School)

## Addition in EYFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

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## **GUIDANCE / MODELS AND IMAGES**

If available, Numicon shapes are introduced straight away and be used to:

- identify 1 more/less
- combine pieces to add
- find number bonds
- add without counting

Children can record this by printing or drawing around Numicon pieces.

Children can begin to combine groups of objects using concrete apparatus:



Construct number sentences verbally or using cards to go with practical activities.





Children are encouraged to read number sentences aloud in different ways "Three add two equals 5" "5 is <u>equal</u> to three and two" "5 is the <u>same as</u> three and two"

Children make a record in pictures, words or symbols of addition activities.



Solve simple problems using fingers

Number tracks can be introduced to count up on and to find one more: What is 1 more than 4? 1 more than 13?

1 2 3 4 5 6

Number lines can be used alongside number tracks and practical states by apparatus to solve addition calculations and word problems:



Children will need opportunities to look at and talk about different models and images as they move between representations.

KEY VOCABULARY

Games and songs can be useful way to begin using vocabulary involved in addition i.e. One elephant went out to play

plus

estimate

add

more

and

sum total

make

altogether

score double

one more, two more, ten more...

how many more make?

How many more is ... than ...?

same as

## Focus: Adding with numbers up to 20

Children should use number lines (with the numbers on) to add by counting in ones. Starting with the greatest number and counting on the smaller number.



As well as using a numberline, children in Year 1 need to:

- Use a variety of equipment to solve addition problems, including counting equipment, everyday objects, number tracks etc.
- Read and write the addition (+) and equals (=) sign and use them in number sentences.
- Solve addition number sentences and missing number problems: 7 + 4 = ?, 1 + 2 + 1=?, ? + ? = 9 etc.
- Use bead strings or bead bars to visualise bridging through 10s e.g. 8 + 5 = can be solved by counting on 2 then counting on 3.



## Key Vocabulary

Add, more, plus, and, make, altogether, total, equal to, equals, the same as, double, most, count on, numberline

## <u>Key Skills</u>

- 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.



Objective & Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	Use part part whole model. Use cubes to add two numbers together as a group or in a bar.	3 Balls 2 Balls Use pictures to add two numbers together as a group or in a bar.	4 + 3 = 7 $5$ $3$ $10 = 6 + 4$ Use the part-part whole diagram as shown above to move into the abstract.
Starting at the big- ger number and counting on	Start with the larger number on the bead string and then count on to the smaller num-	12 + 5 = 17 10 11 12 13 14 15 16 17 18 19 20 Start at the larger number on the number line and count on in ones or in one jump to	5 + 12 = 17 Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10. This is an essential skill for column addition later.	ber 1 by 1 to find the answer.         6+5=11         Start with the bigger number and use the smaller number to make 10.         Use ten frames.	find the answer. find the answer. 3 + 9 = Use pictures or a number line. Regroup or partition the smaller number using the part part whole model to make 10. 9 + 5 = 14 1 + 4 1 + 2 1 + 3 + 5 = 14 1 + 4 1 + 1 + 4 1 + 14 1 + 14	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
Represent & use number bonds and related subtraction facts within 20	2 more than 5.	$\begin{array}{c c} & & & & \\ \hline \\ \hline$	Emphasis should be on the language '1 more than 5 is equal to 6.' '2 more than 5 is 7.' '8 is 3 more than 5.'

## Focus: Adding with 2 digit numbers.

Children should explore and understand how to use blank numberlines to add using their knowledge of place value and how to partition numbers in different ways. Once confident they should move onto written partitioning methods.



## Key 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* 

- Add a 2 digit number and units and a 2 digit number and 10s.
- Add pairs of 2 digit numbers.
- Add three signle digit number.
- Know and show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and multiple of 10 bonds to 100.
- Count in steps of 2,3 and 5 and count in 10s from any number.
- Understand the place value of 2 –digit numbers (tens and ones).
- Compare and order numbers to 100 using < > and = signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve contextual addition problems.



Objective &	Concrete	Pictorial	Abstract
Strategy			
Adding multiples of	50= 30 = 20		20 + 30 = 50
ten	11111		70 = 50 + 20
		3 tens + 5 tens = tens 30 + 50 =	40 + □ = 60
	Model using dienes and bead strings	Use representations for base ten.	
Use known number facts Part part whole	20 Children ex- plore ways of making num- bers within 20	20 - = = = = = = = = = = = = = = = = = =	+ 1 = 16 $16 - 1 =1 + = 16$ $16 - = 1$
Using known facts		$\begin{array}{c} \vdots & + \vdots & = & \vdots \\  (  +  )   & = &         \\ \hline \\ \hline$	3 + 4 = 7 <i>leads to</i> 30 + 40 = 70 <i>leads to</i> 300 + 400 = 700
Bar model		7 + 3 = 10	23 25 ? 23 + 25 = 48

Objective &	Concrete	Pictorial	Abstract
Strategy			
Add a two digit number and ones	17 + 5 = 22 Use ten frame to make 'magic ten Children explore the pattern. $17 + 5 = 22$ $27 + 5 = 32$	Use part part whole and number line to model. 17 + 5 = 22 3 2 16 + 7 16 + 7 16 = 20 23	17 + 5 = 22 Explore related facts $17 + 5 = 22$ $5 + 17 = 22$ $22 - 17 = 5$ $17 - 5$ $22 - 5 = 17$
Add a 2 digit num- ber and tens	25 + 10 = 35 Explore that the ones digit does not change	27 + 30 +10 +10 +10 27 37 47 57	27 + 10 = 37 27 + 20 = 47 27 + □ = 57
Add two 2-digit numbers	Model using dienes , place value counters and numicon	+20 +5 Or +20 +3 +2 47 $67$ $72$ $47$ $67$ $70$ $72Use number line and bridge ten using partwhole if necessary.$	25 + 47 $20 + 5$ $40 + 7$ $20 + 40 = 60$ $5 + 7 = 12$ $60 + 12 = 72$
Add three 1-digit numbers	Combine to make 10 first if possible, or bridge 10 then add third digit	Regroup and draw representation. + $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$	4 + 7 + 6 = 10 + 7 $= 17$ Combine the two numbers that make/bridge ten then add on the third.



## Key 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, exchange, expanded, compact

- 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 ones).
- 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.





## Focus: Adding with numbers up to 4 digits

In year 4 children will consolidate their use of the traditional column method and will be able to use it confidently to add numbers up to 4 digits. This could include exchanging ones, tens and hundreds.



### Remember!

The ones must be added first!
 'Exchange' numbers underneath the bottom line!
 Reinforce the place value! It is not 6 add 8, it is 6 tens add 8 tens!

## Key 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, hundreds boundary, increase, vertical, carry, expanded, compact, *thousands, digits, inverse*.

## 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 Four

## Focus: Adding with more than 4 digits

In year 5 children will now use the column method to add decimal numbers in the context of money and measures. It is important that children have place value skills beyond 4 digits here and fully understand what a decimal number represents.



## Key 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, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, *decimal place*,

## decimal point, tenths, hundredths, thousandths.

- 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.



## Focus: Adding several numbers with an increasing level of complexity

In year 6 children need to use all the previous adding skills developed to add several numbers with a variety of different decimal places. Many of these problems will be in the context of money or measures.



## Key Voebulary

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, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse, decimal place, decimal point, tenths, hundredths, thousandths, *integer* 

- 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 decimal numbers to the nearest whole number.





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## Subtraction in EVFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

## **GUIDANCE / MODELS AND IMAGES**

Children begin with mostly pictorial representations or real contexts.

Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left.

Concrete apparatus models the subtraction of 2 objects from a set of 5.

Construct number sentences verbally or using cards to go with practical activities.

Children are encouraged to read sentences aloud in different ways "five subtract one leaves four" "four is equal to five subtract one" "four is the same as five subtract one"

Children make a record in pictures, words or symbols of subtraction activities.

Solve simple problems using fingers

Number tracks can be introduced to count back and to find one less: What is 1 less than 9? 1 less than 20?

Number lines can then be used alongside number tracks and practical apparatus to solve subtraction calculations and word problems. Children count back showing hops

back on the number back.

Zero Gravity	Eric
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10-3=7		2	3	4	5	è	ļ	8	

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ck and to find one less.	
wher treaks and practical an	_



KEY VOCABULARY

Games and songs can be useful way to begin using vocabulary involved in addition i.e. Five little men in a flying saucer

take (away)

estimate leave

how many are left / left over?

how many have gone/

one less, two less, ten less...?

how many fewer is ...?

than ...?

difference between

the same as

hopping back

Children will need opportunities to look at and talk about different models and images as they move between representations.

## Subtraction Focus: Subtracting from numbers up to 20 In Year 1, children will use numberlines, objects and visual models to understand subtraction as taking away but also as the difference between or distance between two numbers. Hundred squares, number tracks, For 7 take away 4, the child would start on counting objects and real life objects the numberline at 7 and count back 4 in ones. should all be used as well to explore This would give them the answer 3. -1 -1 -1 -1 subtraction in a variety of practical contexts. 2 5 3 4 6 7 To answer problems such as how many more is 7 than 4 or what is the difference between 7 and 4, cubes should be made into rods so children can see the problem visually. This method can also be used to answer 'find the distance' problems. Mental subtraction is equally important in year 2 and children should practice recalling subtraction facts up to and within 10 and 20. In year 1 children should also be taught about subtracting zero. **Key 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\_?

## <u>Key Skills</u>

- 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 One

Objective & Strategy	Concrete	Pictorial	Abstract
Taking away ones.	Use physical objects, counters , cubes etc to show how objects can be taken away. 6-4=2		7—4 = 3
	4−2 = 2 <b>♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ </b>		16—9 = 7
Counting back	Move objects away from the group, counting backwards. Move the beads along the bead string as you count backwards	$\begin{array}{c c} -1 & -1 & -1 & 5 & -3 & = 2 \\ \hline & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ \hline \end{array}$ Count back in ones using a number line.	Put 13 in your head, count back 4. What number are you at?
Find the Difference	Compare objects and amounts 7 'Seven is 3 more than four' 4 'I am 2 years older than my	Count on using a number line to find the difference.	Hannah has12 sweets and her sister has 5. How many more does Hannah have than her sister.?
	sister' 5 Pencils 3 Erasers ? Lay objects to represent bar model.	+6 +6 0 1 2 3 4 5 6 7 8 9 10 11 12	

Objective &	Concrete	Pictorial	Abstract
Strategy			
Represent and use number bonds and related subtraction facts within 20 Part Part Whole model	Link to addition. Use PPW model to model the inverse. If 10 is the whole and 6 is one of the arts, what s the other part? 10-6 = 4	Use pictorial representations to show the part.	Move to using numbers within the part whole model.
Make 10	14—9	13-7 $3 - 7 = 6$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3 - 4$ $3 - 3$ $3$	16—8 How many do we take off first to get to 10? How many left to take off?
Bar model	5-2 = 3		8     2       10 = 8 + 2       10 = 2 + 8       10-2 = 8       10-8 = 2

## Focus: Subtracting with 2 digit numbers

In year 2 children will start to use blank numberlines to subtract by counting back which will greatly support the development of mental subtraction skills. Base 10 is also a super subtraction tool and should be used alongside blank numberline methods.



## Key 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

- 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.



<b>Objective &amp; Strategy</b>	Concrete	Pictorial	Abstract
Regroup a ten into ten ones	Use a PV chart to show how to change a ten into ten ones, use the term 'take and make'	20 - 4 =	20—4 = 16
Partitioning to sub- tract without re- grouping. 'Friendly numbers'	34–13 = 21	Children draw representations of Dienes and cross off. Children draw representations of Dienes and diamondation of Dienes and diamondatio of Dienes and di	43—21 = 22
Make ten strategy Progression should be crossing one ten, crossing more than one ten, cross- ing the hundreds.	34-28 Use a bead bar or bead strings to model counting to next ten and the rest.	4 +4 +10 +3 76 80 90 93 'counting on' to find 'difference' Use a number line to count on to next ten and then the rest.	93—76 = 17



## Key Vocabulary

E uals, 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* 

## 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 Three

Objective &	Concrete	Pictorial	Abstract
Strategy			
Column subtraction without regrouping (friendly numbers)	47—32	Laculations Calculations 54 -22 -22 -32 Darw representations to support under- standing	$47 - 24 = 23$ $-\frac{40 + 7}{20 + 3}$ Intermediate step may be needed to lead to clear subtraction under- standing. $32$ $-12$ $20$
Column subtraction with regrouping	Tens Units	45 -29 Tens Ones 16 HIL 2000	$\begin{array}{c} 836 - 254 = 582 \\ \hline 300 & 130 & 6 \\ - 200 & 50 & 4 \\ \hline 500 & 80 & 2 \end{array}$ Begin by partitioning into pv columns
	Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into tten ones. Use the phrase 'take and make' for exchange.	$\begin{bmatrix} 2 & 2 & -1 & 0 \\ 2 & 0 & -1 & 0 \\ 10 & + & 6 & -1 & 0 \end{bmatrix}$ Children may draw base ten or PV counters and cross off.	7 2 8 - 582 = 146       Then move to $\overset{H}{\cancel{7}}$ '2 8 $\overset{f}{\cancel{7}}$ '2 8 $5$ 8 2         1       4

## Focus: Subtracting with numbers up to 4 digits

Children will consolidate their knowledge of the partitioning column method for subtraction with 4 digit numbers including those where exchanging is required. Once they are secure with this they will move on to the compact (traditional) method of column subtraction.

Children will consolidate their learning of the partitioning column method of 2754-1562=1192 subtraction and exchanging by solving calculations with more complex numbers. Place value counters will come in handy here when building children's confidence. 600 Money can also be partitioned for subtraction e.g.  $\pounds 1 + 30 + 5 - \pounds 1 + 10 + 2 =$ 2000 + 700 + 50 + 4000+500+60+ 000 100+90+2۱ Once confident children are ready to move on to the compact method of subtraction. Encourage children to complete a calculation in the partitioning column methods and then model compact method. See if children can see how they are linked and discuss which is simpler. Although this is seen as the 'easiest' method it does not mean that it is necessarily the best method and they need to carefully select the best method for the problem they are solving.

## Key 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*.

- 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.



## Focus: Subtracting with numbers beyond 4 digits including decimals

Children in year 5 will continue to use the compact column method of subtraction to solve problems including those where exchanging is required. They will subtract larger integers and begin to subtract decimal amounts.



## Key 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

## 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 Five

## Focus: Subtracting with increasingly complex numbers including decimals

In year 6, children need to use mental methods and the compact column method of subtraction to solve an increasingly complex range of calculation including those with integers, those with decimals and those with mixed numbers.





They will also solve problems in context involving increasingly large decimals. They will need to continue using their knowledge of decimal points to line up their numbers and place zeroes in any empty places so they fully understand the value of that column.



## Key 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

- 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, 10000, 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.



Objective &	Concrete		Pictorial	Abstract
Strategy				
Subtracting tens	234 -	- 179	Children to draw pv counters and show their exchange—see Y3	e
Year 4 subtract with up to 4 digits. Introduce decimal subtrac- tion through context of money	Image: Second system       Image: Second system <td< th=""><th>Ange using Numi- n move to PV coun-</th><th></th><th>2 7 5 4 - 1 5 6 2 1 1 9 2 Use the phrase 'take and make' for ex- change</th></td<>	Ange using Numi- n move to PV coun-		2 7 5 4 - 1 5 6 2 1 1 9 2 Use the phrase 'take and make' for ex- change
Year 5- Subtract with at least 4 dig- its, including money and measures. Subtract with decimal values, including mixtures of integers and decimals and aligning the decimal	As Year 4		Children to draw pv counters and show their exchange—see Y3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Year 6—Subtract with increasingly large and more complex numbers and decimal values.				$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

## Multiplication in EVFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

## **GUIDANCE / MODELS AND IMAGES**

KEY VOCABULARY

The link between addition and multiplication can be introduced through doubling.

If available, numicon is used to visualise the repeated adding of the same number. These can be drawn around or printed as a way of recording.

Children being with mostly pictorial representations:



How many groups of 2 are there? 2 + 2 + 2 + 2 + 2, so 5 groups of 2

Real life contexts and use of practical equipment to count in repeated groups of the same size:



How many wheels are there altogether?

Count in twos, fives, tens both aloud and with objects.



How much money do I have?

Children are given multiplication problems set in a real life context. Child are encouraged to visualise the problem.

How many fingers on two hands? How many sides on three triangles? How many legs on four ducks?

Children are encouraged to read number sentences aloud in different ways "five times two makes ten" "ten is equal to five multiplied by two" "ten is the same as five lots of two"

Lots of Groups of Times Multiply Multipled by Multiple of Once, twice, three times... ten times... ... times as (big, long, wide... and so on) repeated addition double estimate add again and again

## Multiplication

Focus: Repeated addition with objects, arrays and pictorial representations.

In year one children will be exposed to many different multiplication based activities in a variety of contexts. Much of this will be repeated addition activities or be linked to counting in 2s, 5s or 10s.



#### Key Vocabulary

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

- 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.



Objective &	Concrete	Concrete Pictorial	
Strategy			
Doubling	Use practical activities using manip- ultives including cubes and Numicon to demonstrate doubling + = = = + = = = double 4  is  3 $4 \times 2 = 8$ $+ = = = = =$	Draw pictures to show how to double numbers	Partition a number and then double each part before recombining it back together. 16 10 10 10 10 10 10 12 20 + $12$ = $32$
Counting in multi- ples	Count the groups as children are skip counting, children may use their fin- gers as they are skip counting.	Children make representations to show counting in multiples. $ \begin{array}{c} 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 &$	Count in multiples of a number aloud. Write sequences with multiples of num- bers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30
Making equal groups and counting the total	Use manipulatives to create equal groups.	Draw to show 2 x 3 = 6 Draw and make representations	2 x 4 = 8

Objective &	Concrete	Pictorial	Abstract
Strategy			
Repeated addition	Use different objects to add	Use pictorial including number lines to solve prob There are 3 sweets in one bag. How many sweets are in 5 bags altogether? 3+3+3+3+3 = 15 • • • • • • • •	Write addition sentences to describe objects and pictures. $\underbrace{\begin{array}{c} \hline \\ \hline $
Understanding ar- rays	Use objects laid out in arrays to find the an- swers to 2 lots 5, 3 lots of 2 etc.	Draw representations of arrays to show under- standing	3 x 2 = 6 2 x 5 = 10



Focus: Multiplying using arrays and repeated addition- 2,3,4,5,10x table facts In year 2 children will be aware of simple arrays and pictorial representations and understand what they mean. In year 2 children will develop the knowledge of how to make their own arrays to solve a problem and also how repeated addition on a numberline can get them to a solution.



### Key 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* 

### Key Skills

- Count in steps of 2,3 and 5 from zero and in 10s from any number.
- Recall and use multiplication and division 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.

Year Two

• Use and become familiar with all of the above multiplication language.

Objective &	Concrete	Pictorial	Abstract
Strategy			
Doubling	Model doubling using dienes and PV counters.	Draw pictures and representations to show how to double numbers	Partition a number and then double each part before recombining it back together. 16 10 10 10 10 10 10 10 10
Counting in multi- ples of 2, 3, 4, 5, 10 from 0 (repeated addition)	Count the groups as children are skip counting, children may use their fin- gers as they are skip counting. Use bar models. 5+5+5+5+5+5+5=40	Number lines, counting sticks and bar models should be used to show repre- sentation of counting in multiples. $\frac{3}{10} + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + $	Count in multiples of a number aloud. Write sequences with multiples of numbers. 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25, 30 $4 \times 3 =$

Objective &	Concrete	Pictorial	Abstract
Strategy			
Multiplication is commutative	Create arrays using counters and cubes and Numicon.	Use representations of arrays to show different calculations and explore commutativity.	12 = $3 \times 4$ 12 = $4 \times 3$ Use an array to write multiplication sentences and reinforce repeated addition. 5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 $5 \times 3 = 15$ $3 \times 5 = 15$
Using the Inverse This should be taught alongside division, so pupils learn how they work alongside each other.		$\begin{vmatrix} 4 & 2 \\ 4 & 2 \\ \end{vmatrix} \times \end{vmatrix} = \end{vmatrix}$ $\begin{vmatrix} \times \\ \times \\ 0 & \times \end{vmatrix} = \end{vmatrix}$ $\begin{vmatrix} \times \\ 0 & \times \\ 0 & \times \end{vmatrix} = \end{vmatrix}$ $\begin{vmatrix} \times \\ 0 & \times \\ 0 & \times \end{vmatrix} = \end{vmatrix}$ $\begin{vmatrix} \times \\ 0 & $	2 x 4 = 8 4 x 2 = 8 8 $\div$ 2 = 4 8 $\div$ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 $\div$ 4 4 = 8 $\div$ 2 Show all 8 related fact family sentences.

## Focus: Multiplying 2 digit numbers by 1 digit numbers

In year 3 children will move on from arrays and start using the grid method of multiplication. It is essential that before children move onto the grid method they are completely confident with all previous methods and have a solid grounding with mental methods and partitioning.

#### Before moving on to grid multiplication, children need to be able to ...

- Partition numbers into tens and ones
- Multiply single digits by multiples of 10 (3 x 30 = 90).
- Quickly recall multiplication facts for the 2,3,4,5,6 and 10 x tables.
- Use any previous method to work out unknown multiplication facts, quickly and accurately.



The grid method should be introduced using an arrays model such as the one to the left for 14 x 6. Children need to use their partitioning skills to partition the two digit number and then use their existing knowledge of arrays to come to an answer with minimal support.

×	30	5
7	210	35
2	0 + 35 = 2	245
	× 7	×     30       7     210       210 + 35 = 2

## Key Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, <sup>CO</sup> mmutative, sets of, equal groups, times as big as, once, twice, three times, *partition, grid method, multiple*,

#### product, tens, ones, value

## 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. 4x12x5=4x5x12=20x12=240) and for missing number problems.

Year Three



## Multiplication

## Focus: Multiplying 2 and 3 digit numbers by 1 digit numbers

In year 4 children need to use the grid method confidently to solve problems where a 2 or 3 digit number is multiplied by a one digit number. They need to move on to the use of short multiplication to solve 3 digit number multiplied by 1 digit problems.



253 x 9 is approximately 250 x 10 = 2500

### Key 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* 

## 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.

Year Four

- Use commutativity mentally to solve problems.
- Solve problems in a range of contexts that are increasingly complex.



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## Multiplication

## Focus: Multiplying up to 4 digits by 1 or 2 digits

In year 5 children will continue to use short multiplication to solve increasingly richer problems that involve multiplying by 1 digit. They will then move on to long multiplication for problems that involve multiplying by 2 digits. Approximation will play an important part- with children making approximations before using long multiplication to help check their answer is correct.



## Key Vocabulary

Groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, e ual 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, exchange* 

## 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 Five

## Multiplication

Focus: Consolidating short and long multiplication, multiplying decimals by 1 digit In year 6 children will consolidate all they know about short and long multiplication before they go to Secondary school. They will also learn the new skill of using short multiplication to multiply decimal numbers to 2 decimal places.

	3	•	١	9	When multiplying decimals it is important to
x	8				remember that the digit you are multiplying by needs to be lined up with the ones digits. As wit all decimal work, the decimal points must be lined up and the children need to have a clear
2	5	•	5	2	understanding why that is.
			7		

### Key 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* 

- 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.





Objective &	Concrete	Pictorial	Abstract
Strategy			
Multiplying decimals up to 2 decimal plac-			Remind children that the single digit belongs in the units column. Line up the decimal
es by a single digit.			points in the question and the answer.
			2 1 0
			$3 \cdot 1 9$
			× 8 2 5 . 5 2
			1
			(

## Division in EVFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

## **GUIDANCE / MODELS AND IMAGES**

The ELG states that children solve problems including doubling, halving and sharing.

Children need to see and hear representations of division as both grouping and sharing.

Division can be introduced through halving.

Children begin with mostly pictorial representations linked to real life contexts.

Mum has 6 socks. She grouped them into pairs – how many pairs did she make? How many socks did she have altogether?

Sharing model:

I have 10 sweets. I want to share them with my friend. How many will we have each?



Although not explicit in the development matters document, the sharing model is a useful way of introducing young children to fractions and calculating with fractions.

Setting the problems in a real life context and solving them with concrete apparatus will support children's understanding.

"I have got a whole pizza to share between two people. Can you cut the pizza in half?"

Children make a record in pictures, words or symbols of division activities.



Children are encouraged to have a go at recording the calculation which has been carried out.

## **KEY VOCABULARY**

halve share share, share equally one each, two each, three each... groups in pairs, threes... tens equal groups of divide divided by divided into left, left over estimate fraction half halves whole quarter

## Division

## Focus: Grouping and sharing small quantities without remainders

As an introduction to division, children in year 1 will solve problems in familiar and relevant contexts where they have to group and share. They will use objects and pictorial representations to solve problems and they will begin to use counting in 2s, 5s and 10s to support their problems solving.



## Key Vocabulary

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

### <u>Key Skills</u>

- 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.



Objective &	Concrete	Pictorial	Abstract	
Strategy				
Division as sharing		Children use pictures or shapes to share quanti- ties.	12 shared between 3 is	
Use Gordon ITPs for modelling		\$\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	4	
		Sharing:		
	10	12 shared between 3 is 4		
	I have 10 cubes, can you share them equally in 2 groups?			

## Division

Focus: Grouping and sharing larger quantities using written methods and symbols Children will continue to use the methods of sharing and grouping in division with objects to support their understanding of arrays for sharing and grouping and the division numberline for grouping.



## Key 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* 

- Count in steps of 2,3 and 5 from 0.
- Recall and use x and ÷ 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.



Objective &	Concrete	Pictorial	Abstract
Strategy			
Division as sharing	Image: here the equal provided in t	Children use pictures or shapes to share quanti- ties. 3 + 2 = 4 Children use bar modelling to show and support understanding. 12 12 + 4 = 3	12÷3=4
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use number lines for grouping $ \begin{array}{c}                                     $	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

## ÍVÍSÍON

## Focus: Dividing 2 digit numbers by 1 digit numbers moving from numberline methods to short division

Children in year 3 will continue to use a numberline to solve division problems and will begin to jump more than one step at a time in the style of 'chunking'. Once confident they will move on to short division without any remainders.



### Key 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, exchange remainder, multiple* 

- Recall and use and ÷ 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.



Objective &	Concrete	Pictorial	Abstract
Strategy			
Division as grouping	Use cubes, counters, objects or place value counters to aid understanding. 24 divided into groups of $6 = 4$ 96 ÷ 3 = 32 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Continue to use bar modelling to aid solving division problems. 20 20 $\div$ 5 = ? 5 x ? = 20	How many groups of 6 in 24? 24 ÷ 6 = 4
Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	Draw an array and use lines to split the array into groups to make multiplication and division sentences	Find the inverse of multiplication and division sentences by creating eight linking number sentences. $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$

#### Dane Bank Primary School Calculation Policy





### Key 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* 

- 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 ÷ 5 = 20 so 20 x 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.



## Division

## Focus: Extending use of short multiplication to 4 digits and remainders

Children in year 5 will use short division to solve problems up to 4 digits long. For the first time they will use short division to solve problems that have a remainder in the final answer.



In year 5 children will begin to solve division problems where a number up to 4 digits is divided by a single digit number including answers with remainders. These division problems need to be contextual so the children learn how to express the remainder- as a number, a fraction, a decimals, rounded up or rounded down.

## Key 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)* 

- Multiply and divide numbers mentally, using known facts.
- Identify multiples and factors, including all factor pairs of a number and common factors between 2 numbers.
- Solve x and ÷ problems where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and decimals by 10, 100 and 1000.
- Use vocabulary of prime numbers, prime factors and composite numbers.
- Work out whether a number up to 100 is prime and know all prime numbers to 30.
- Use and understand multiplication and division as inverses.
- Present division with remainders answers differently, showing the remainder as a fraction, decimal or whole number by rounding.
- Solve problems with a combination of all four operations including fraction scaling problems and problems involving simple rates.





## Division

Focus: Using short division to divide 4 digit numbers and express remainders as decimals and long division for dividing 2 digit numbers

In year 6, children will use short division to divide decimal numbers by single digit numbers. The final step of division will be long division which will be used to divide numbers by 2 digits.



## Key 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* 

- 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.







## Long Division

Step 2—a remainder in the tens

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o <mark>2</mark> 2 ) <mark>5</mark> 8	t o 2 2 ) <mark>5</mark> 8 -4 1	t o 2 9 2 ) 5 8 <u>- 4 ↓</u> 1 8
Two goes into 5 two times, or 5 tens ÷ 2 = 2 whole tens but there is a remainder!	To find it, multiply $2 \times 2 = 4$ , write that 4 under the five, and subtract to find the remainder of 1 ten.	Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o	to	t o
2 9 2 ) 5 8	2 9 2 5 8	2 ) 5 8
<u>-4</u> 18	<u>-4</u> 18	$\frac{-4}{18}$
	<u>- 1 8</u> 0	<u>- 1 8</u> 0
Divide 2 into 18. Place 9 into the quotient.	Multiply 9 × 2 = 18, write that 18 under the 18, and subtract.	The division is over since there are no more digits in the dividend. The quotient is 29.



## GLOSSARY OF TERMS

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.

**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

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 4x7 then you also know  $40 \times 70$ ,  $4 \times 0.7$  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 of 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 them 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 then 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 x 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.