



# Year 1 – Addition

## End of year expectations for mental calculations:

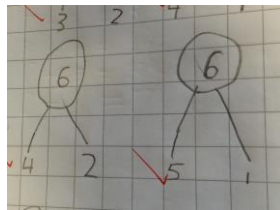
- Given a number, identify one more and one less
- Recall of number bonds for all numbers to 10 and 20 (E.g knowing all the numbers that make 5)
- Recall of doubles (e.g  $7 + 7 = 14$ )**
- Use of near doubles (eg,  $6 + 7 = \text{double } 6 + 1 = 13$ )**

## End of year expectations for written calculations:

- Read, write and interpret mathematical statements involving addition(+)
- Represent and use number bonds and related subtraction facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero

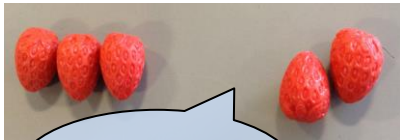
## Progression in methods taught:

### Bubble numbers



*I know that 6 can be made of 4 and ; and 5 and 1.*

Children will begin counting in ones (combining groups) before being encouraged to start with the biggest number and add on the smallest number



*1, 2, 3, 4, 5 so  $3 + 2 = 5$*



*I know that this is 3 so I can count from there.*

Children can then use their fingers and move on to 'putting the biggest number in their tummy' and counting on.

Partition and combine tens and ones using Dienes

Children can record their addition independently

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

### Concrete materials



### Numicon



### Fingers



### Beadstrings





# Year 1 – Subtraction

## End of year expectations for mental calculations:

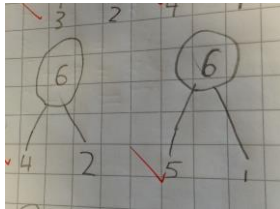
- Given a number, identify one more and one less
- Recall of number bonds for all numbers to 10 and 20 (E.g knowing all the numbers that make 5)
- Rapid recall of subtraction facts related to number bonds (e.g.  $4 + 6 = 10$  therefore  $10 - 6 = 4$ )**

## End of year expectations for written calculations:

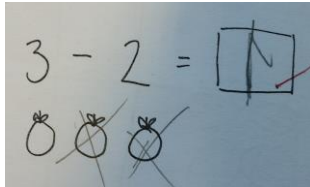
- Read, write and interpret mathematical statements involving subtraction (-)
- Represent and use number bonds and related subtraction facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero

## Progression in methods taught:

### Bubble numbers



Children are encouraged to remove certain number of objects from the group, before representing groups in pictures and striking through the number of objects to be removed.



Children also use a number track to count back

Children can find the difference between two numbers by comparing or counting

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

### Concrete materials



### Numicon



### Fingers



### Beadstrings





# Year 1 – Multiplication

## End of year expectations for mental calculations:

- Count in steps of 2, 5, and 10.
- Can double numbers to 10.

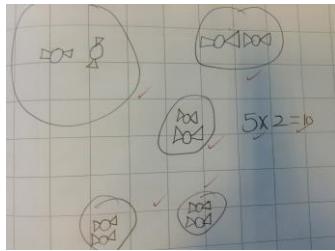
## End of year expectations for written calculations:

- Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

## Progression in methods taught:

Counting groups of objects and use the vocabulary associated with multiplication in practical contexts

Demonstrate their understanding by drawing groups of objects



Understanding that multiplication is repeated addition



6  
six



6  
six

2 groups of 6 = 12

With support, children begin to represent multiplication sentences as arrays.

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

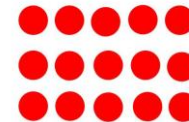
Concrete materials



Numicon



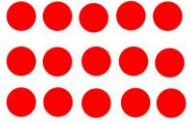


Arrays





# Year 1 – Division

<p><b>End of year expectations for mental calculations:</b> -Can halve numbers to 10.</p>	<p><b>End of year expectations for written calculations:</b> - Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</p>
<p><b>Progression in methods taught:</b></p> <p>Physically <u>sharing</u> a group of objects and understanding that each group made must be equal (e.g 10 sweets shared between 5 people, how many do they each get?)</p> <p>Understanding division as <u>grouping</u> or repeated subtraction (e.g there are 10 sweets, how many people can have 5 sweets?)</p> <p>Use of arrays to support early division</p>	<p><b>Models/images/resources used:</b> <b>We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations</b></p> <p>Concrete materials </p> <p>Numicon </p> <p>Arrays </p>



# Year 2 – Addition

## End of year expectations for mental calculations:

- recall and use addition (and subtraction) facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers

## End of year expectations for written calculations:

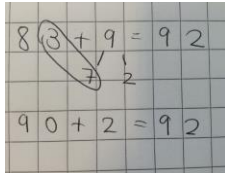
- solve problems with addition and subtraction:
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

## Progression in methods taught:

**Bubble numbers (being able to partition all numbers to 100)**

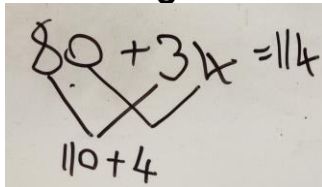
**Adding 3 one-digit numbers (making number bonds to 10 or adding doubles)**

**2 digit add one digit method**



**Initially using Dienes making two digit numbers then adding the tens and then adding the ones.**

**Moving on to the 'W method'. Eventually children should be able to add two 2-digit numbers mentally.**



## Models/images/resources used:

**We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations**

Concrete materials



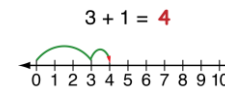
Numicon



Egg boxes



Number lines





# Year 2 – Subtraction

## End of year expectations for mental calculations:

- recall and use addition (and subtraction) facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers

## End of year expectations for written calculations:

- solve problems with addition and subtraction:
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
  - adding three one-digit numbers
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

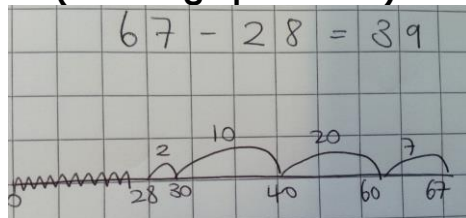
## Progression in methods taught:

### Partitioning numbers

Subtracting single digit number from two digit number  
 Counting back to nearest multiple of 10. Using number line?

Subtracting multiples of 10 from two digit number

Blank number line (counting up or back)



Partion numbers

67	-	28	=		
67	-	20	=	47	
47	-	8	=	39	

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

Concrete materials



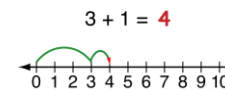
Numicon



Egg boxes



Number lines





# Year 2 – Multiplication

## End of year expectations for mental calculations:

recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

## End of year expectations for written calculations:

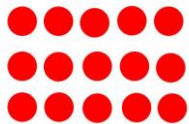
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals (=) signs  
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

## Progression in methods taught:

Counting groups of the same number of objects

Skip counting (3, 6, 9 etc)

Representing number sentence pictorially



3 groups of 5 objects ( $3 \times 5 = 15$ )

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

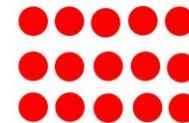
Concrete materials



Numicon



Arrays





# Year 2 – Division

## End of year expectations for mental calculations:

- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers

## End of year expectations for written calculations:

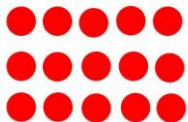
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs  
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

## Progression in methods taught:

Physically sharing a group of objects and understanding that each group made must be equal  
(e.g 10 sweets shared between 5 people, how many do they each get?)

Understanding division as grouping or repeated subtraction  
(e.g there are 10 sweets, how many people can have 5 sweets?)

Use of arrays to support division



$$15 \div 3 = 5$$

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

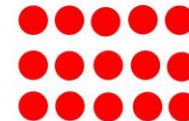
Concrete materials



Numicon



Arrays







# Year 3 – Addition

## End of year expectations for mental calculations:

-add and subtract numbers mentally, including:

- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds

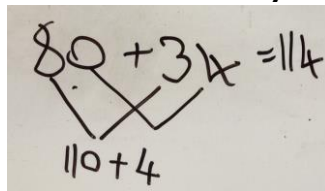
## End of year expectations for written calculations:

- 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.

## Progression in methods taught:

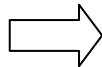
**Bubble numbers (being able to partition all numbers to 100)**

The 'W method' - children should be able to add two 2-digit numbers mentally.



When able to add two digit numbers mentally, moving on to introducing column addition through the extended method initially for adding two three-digit numbers with Dienes

2	0	0	+	6	0	+	4
1	0	0	+	2	0	+	6
3	0	0	+	8	0	+	10



2	6	4
1	2	6
3	9	0

Any numbers to be carried are placed at the top of the next square.

## Models/images/resources used:

**We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations**

Concrete materials





# Year 3 – Subtraction

## End of year expectations for mental calculations:

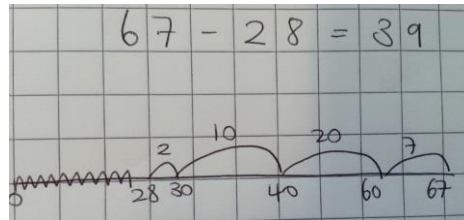
- add and subtract numbers mentally, including:
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds

## End of year expectations for written calculations:

- 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.

## Progression in methods taught:

Blank number line (counting up or back)



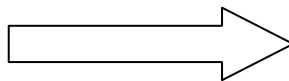
Partition numbers

67	-	28	=		
67	-	20	=	47	
47	-	8	=	39	



Introducing column subtraction using extended method for three digit numbers with Dienes

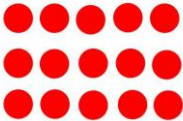
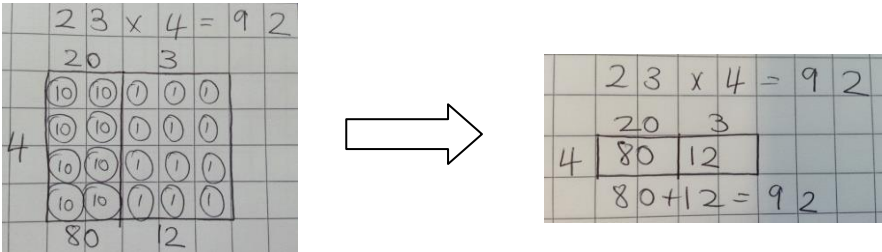


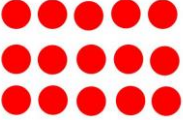
				30		
300	+	40	+	18		
-	200	+	30	+	9	
	100	+		0	+	9



		3	1
3	4	8	
-	2	3	9
	1	0	9



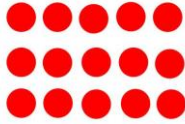


# Year 3 – Multiplication

<p><b>End of year expectations for mental calculations:</b> recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p>	<p><b>End of year expectations for written calculations:</b> - write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods □ solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.</p>
<p><b>Progression in methods taught:</b> <b>Representing number sentence pictorially</b></p>  <p><b>3 groups of 5 items (<math>3 \times 5 = 15</math>)</b></p> <p><b>Multiplying a multiple of 10 by a single digit number</b> e.g <math>20 \times 4</math> (using <math>2 \times 4</math> to work out <math>20 \times 4</math>)</p> <p><b>Blank Array linked to arrays</b></p> 	<p><b>Models/images/resources used:</b> <b>We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations</b></p> <p>Concrete materials </p> <p>Numicon </p> <p>Arrays </p>



# Year 3 – Division

<p><b>End of year expectations for mental calculations:</b></p> <ul style="list-style-type: none"><li>- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</li></ul>	<p><b>End of year expectations for written calculations:</b></p> <ul style="list-style-type: none"><li>- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods</li><li>- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.</li></ul>
<p><b>Progression in methods taught:</b></p> <p><b>Using pictures to support calculations such as:</b></p> $23 \div 4 = 5 \text{ r } 3$	<p><b>Models/images/resources used:</b></p> <p><b>We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations</b></p> <p>Concrete materials </p> <p>Numicon </p> <p>Arrays </p>



# Year 4 – Addition

## End of year expectations for mental calculations:

- Add two digit numbers mentally
- Add one digit number to three digit number mentally
- Adding multiples of 10 and 100 to any number

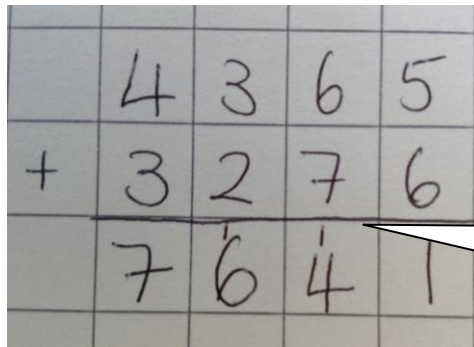
## End of year expectations for written calculations:

- 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.

## Progression in methods taught:

Range of appropriate mental methods for adding two digit numbers

Column addition for adding up to 4 digit numbers with Dienes



Any numbers to be carried are placed at the top of the next square.

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

Concrete materials



1  $1153 + 4959 = ?$

Thousands	Hundreds	Tens	Ones

First, add the ones.

$$\begin{array}{r} 1\ 1\ 5\ 3 \\ + 4\ 9\ 5\ 9 \\ \hline 2 \end{array}$$

3 ones + 9 ones = 12 ones = 1 ten 2 ones



# Year 4 – Subtraction

## End of year expectations for mental calculations:

- Subtract two digit numbers mentally
- Subtract one digit number to three digit number mentally
- Subtract multiples of 10 and 100 to any number

## End of year expectations for written calculations:

- 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.

## Progression in methods taught:

Range of appropriate mental methods for subtracting two digit numbers

Column subtraction for up to 4 digit numbers with Dienes

$$\begin{array}{r} 348 \\ - 239 \\ \hline 109 \end{array}$$

Thousands    Hundreds    Tens    Ones

Then, subtract the hundreds

$$\begin{array}{r} 1249 \\ - 926 \\ \hline 323 \end{array}$$

12 hundreds - 9 hundreds = 3 hundreds



# Year 4 – Multiplication

## End of year expectations for mental calculations:

- recall multiplication and division facts for multiplication tables up to  $12 \times 12$
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply and divide numbers by 10, 100 and 1000

## End of year expectations for written calculations:

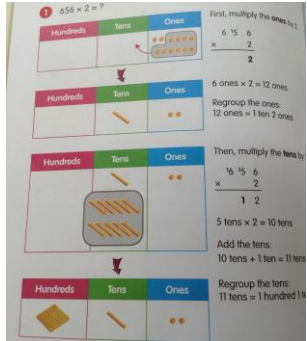
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

## Progression in methods taught:

### Blank Array to support mental calculations

	23	$\times 4$	=	92
	20	3		
4	80	12		
	80	+12	=	92

### Introduction of short multiplication (2 or 3 digit number multiplied by a 1-digit number) with Dienes



	3	4	2
$\times$			7
	2	3	9
			4

Any numbers to be carried are placed at the top of the next square and crossed off when added

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

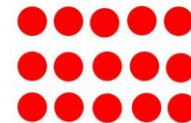
Concrete materials



Numicon



Arrays





# Year 4 – Division

## End of year expectations for mental calculations:

- recall multiplication and division facts for multiplication tables up to  $12 \times 12$
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations

## End of year expectations for written calculations:

- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers

## Progression in methods taught:

### Division using partitioning

$$65 \div 5 = 13$$

$$65 = 50 + 15$$

$$50 \div 5 = 10$$

$$15 \div 5 = 3$$

$$10 + 3 = 13$$

Introduce short division without remainders *with numbers beyond  $12 \times 12$*

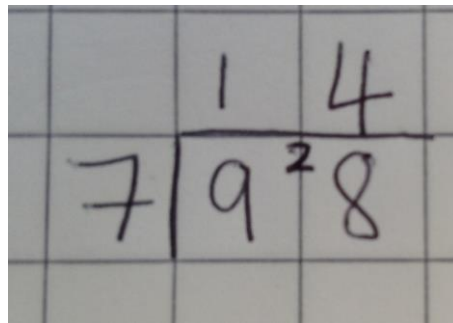
$$98 \div 7 =$$

$$98 = 70 + 28$$

$$70 \div 7 = 10$$

$$28 \div 7 = 4$$

$$10 + 4 = 14$$



## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

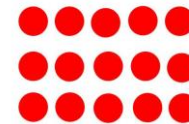
Concrete materials



Numicon



Arrays







# Year 5 – Addition

## End of year expectations for mental calculations:

- add and subtract numbers mentally with increasingly large numbers

## End of year expectations for written calculations:

-add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)  
-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.

## Progression in methods taught:

Column addition for adding whole numbers with more than 4 digits with Dienes if needed

	4	3	6	5
+	3	2	7	6
	7	6	4	1

Any numbers to be carried are placed at the top of the next square.

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

Concrete materials



1  $1153 + 4959 = ?$

Thousands	Hundreds	Tens	Ones

First, add the ones.

$$\begin{array}{r} 1153 \\ + 4959 \\ \hline 2 \end{array}$$

3 ones + 9 ones = 12 ones = 1 ten 2 ones



# Year 5 – Subtraction

## End of year expectations for mental calculations:

- add and subtract numbers mentally with increasingly large numbers

## End of year expectations for written calculations:

-add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)  
-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.

## Progression in methods taught:

Column subtraction for subtracting whole numbers with more than 4 digits with Dienes if needed

		3	
	3	4	8
-	2	3	9
	1	0	9



# Year 5 – Multiplication

## End of year expectations for mental calculations:

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- multiply and divide numbers mentally drawing upon known facts

## End of year expectations for written calculations:

- 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

## Progression in methods taught:

### Blank Array to support mental calculations

	2	3	x	4	=	9	2	
	2	0		3				
4	8	0		1	2			
	8	0	+	1	2	=	9	2

### Introduce long multiplication

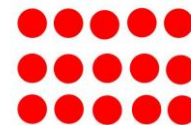
		2	4
x		1	6
	1	4	4
	2	4	0
	3	8	4

When multiplying two digit numbers you start with the unit, e.g.  $6 \times 4$ ,  $6 \times 2$  before multiplying  $10 \times 4$  and  $10 \times 2$

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

Concrete materials





# Year 5 – Division

**End of year expectations for mental calculations:**

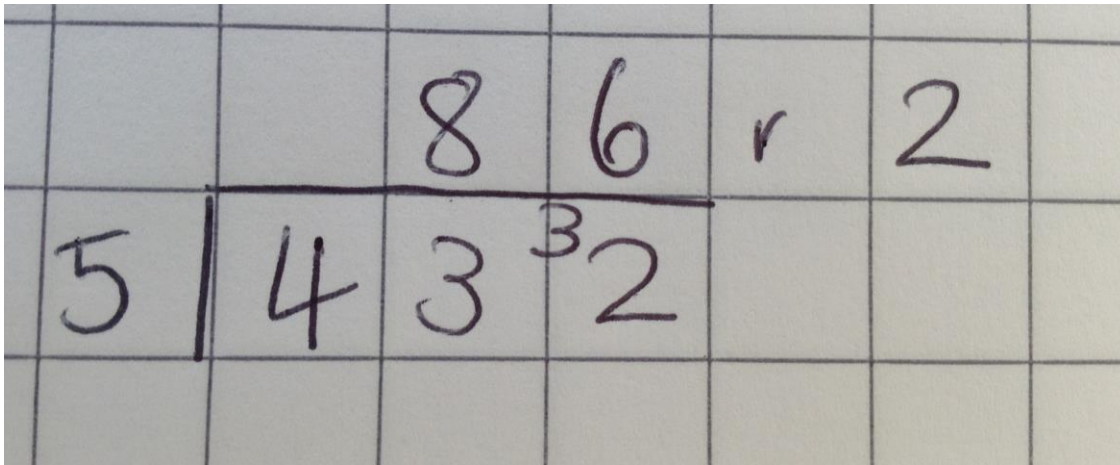
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- multiply and divide numbers mentally drawing upon known facts

**End of year expectations for written calculations:**

- 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

**Progression in methods taught:**

Short division for up to 4 digit numbers divided by one-digit number, with remainders

**Models/images/resources used:**



# Year 6 – Addition

## End of year expectations for mental calculations:

-perform mental calculations, including with mixed operations, large numbers, decimals and basic fractions

## End of year expectations for written calculations:

-use column addition  
-solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why  
-solve problems involving addition, subtraction, multiplication and division

## Progression in methods taught:

### Column addition

	4	3	6	5
+	3	2	7	6
<hr/>				
	7	6	4	1

Any numbers to be carried are placed at the top of the next square.

## Models/images/resources used:

**We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations**

Concrete materials





# Year 6 – Subtraction

## End of year expectations for mental calculations:

-perform mental calculations, including with mixed operations and large numbers

## End of year expectations for written calculations:

-use column subtraction  
-solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why  
-solve problems involving addition, subtraction, multiplication and division

## Progression in methods taught:

### Column subtraction

		3	
	3	4	8
-	2	3	9
	1	0	9





# Year 6 – Multiplication

## End of year expectations for mental calculations:

- perform mental calculations, including with mixed operations and large numbers, and simple decimals
- identify common factors, common multiples and prime numbers

## End of year expectations for written calculations:

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- solve problems involving addition, subtraction, multiplication and division

## Progression in methods taught:

### Short and long multiplication

		2	4
x		1	6
	1	4	4
	2	4	0
	3	8	4

## Models/images/resources used:

We want children to build a develop a mental picture of the number system so we use a range of physical resources and visual representations

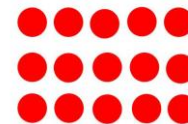
Concrete materials



Numicon



Arrays





# Year 6 – Division

## End of year expectations for mental calculations:

- perform mental calculations, including with mixed operations and large numbers

## End of year expectations for written calculations:

- 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  
-solve problems involving addition, subtraction, multiplication and division

## Progression in methods taught:

### Short division

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 4332} \end{array}$$

### Introduce long division

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{300} \quad (20) \\ 132 \\ \underline{120} \quad (8) \\ 12 \end{array}$$
$$\frac{12}{15} = \frac{4}{5}$$

## Models/images/resources used:

Concrete materials

