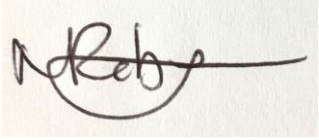
Viking Academy Trust

Parent Calculation Policy
Chilton Primary School

Approved by the Trust: July 2018

Reviewed annually: July

Last review date: July 2018

Signed: 

Chair of Trustees

EYFS 2 Addition

Children will learn:

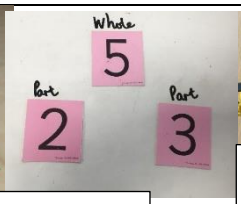
How to represent and use number bonds and related subtraction facts within 10

Add and subtract one-digit and two-digit numbers to 20 including zero

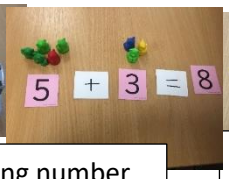
Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations , and missing number problems such as 7 = - 9

Examples of models which can be used for some EYFS2 objectives.

Using part, part whole to add objects.



Adding sets of objects which are the same.



Using number sentences.

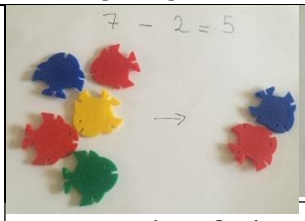
Adding sets of objects which are different.

Children will learn to add using a range of concrete and pictorial resources. Children will be adding in different contexts and move on to creating number sentences.

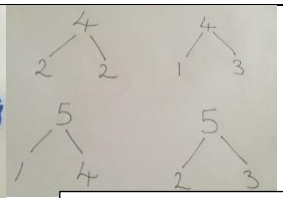
EYFS Subtraction

Children will learn: To count reliably with numbers from 1 to 20 and say which number is one more or one less than a given number. Subtract two single-digit numbers and count on or back to find the answer

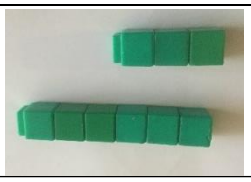
Concrete/ Pictorial representations



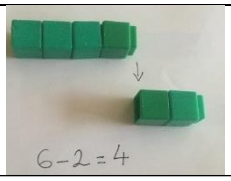
Using numbers & objects to represent subtraction sentences.



Part, part, whole number bonds.



Using cubes to compare amounts



Paring number sentences with concrete resources.

Multiplication EYFS

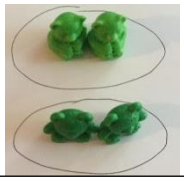
Children will learn to add two single-digit numbers and count on or back to find the answer. They solve problems, including sharing, doubling and halving.

Pictorial representations

Doubling using cubes.

How many wheels on two trucks?
4+4=8
4, 5, 6, 7, and 8
Double 4=8

Numbers which can be put into pairs are even, numbers that can't are odd.



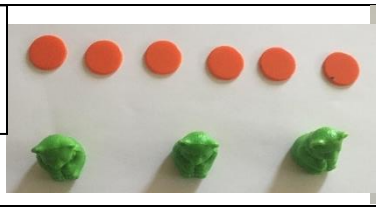
Matching groups of objects.

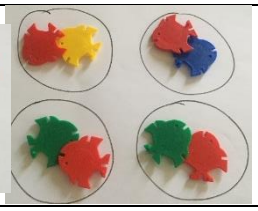
Division EYFS

Children will learn to add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing

Concrete/ Pictorial representations

Halving objects
Sharing objects
Counting objects in arrays

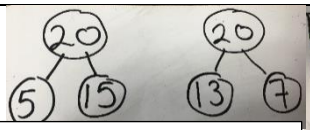




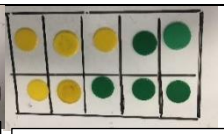
Year 1 Addition

Children will learn to: Represent and use number bonds and related subtraction facts within 20.
Add and subtract one-digit and two-digit numbers to 20 including zero.
Solve one step problems.

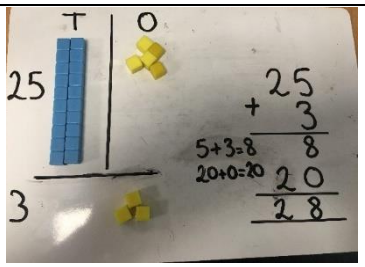
Examples of resources which can be used with Year 1 objectives



Using part-part whole to work out number bonds to twentv.



Use a tens grid to visualise number bonds.

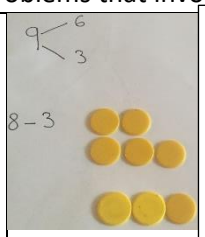


Use of dienes to set out tens and ones of a number.
Vertical addition with no regrouping.

Year 1 Subtraction

Children will learn to represent and use number bonds and related subtraction facts within 20.
Add and subtract one-digit and two-digit numbers to 20 including zero.
Solve one step problems that involve addition and subtraction.

Concrete/ Pictorial representations



9 is 3 and 6
9-3=6
9-6=3
How else can we break up 9?
Count on from three using fingers or counters.

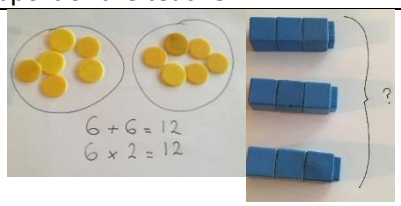
4-3=1
4 and 3= 7
7-3=4
7-4=3

What is 5 less than 7?

Multiplication Year 1

Children will learn to solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

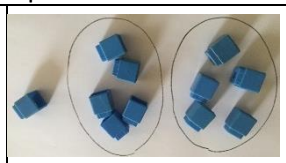
Concrete and visual resources



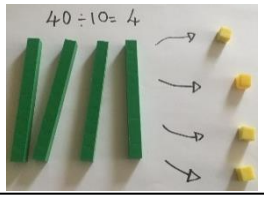
There are 3 children and each child has three sweets. How many sweets do they have altogether?
3+3+3=9
3x3=9

Division Year 1

Children will learn to solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

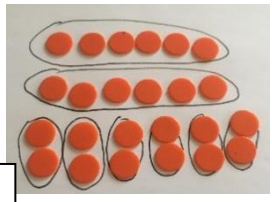


Sharing with odd numbers.



Dividing numbers by 10

If you have 18 cubes, how many towers can you make?



12 divided by 6=2
12 divided by 2=6

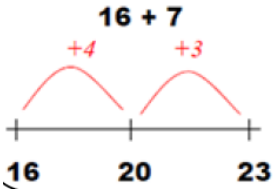
Year 2 Addition

Children will learn to: subtract numbers using concrete objects, pictorial representations, and mentally, including: - A two digit number and ones - A two digit number and tens - Add two two-digit numbers - Adding three one digit numbers

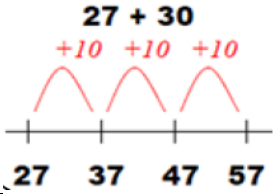
Number lines and partitioning

Children should explore and understand how to use blank number lines. Once confident they should move onto written partitioning methods.

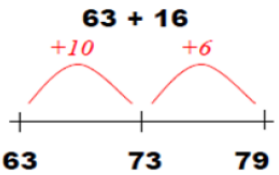
Adding a 2 digit number and units



Adding a 2 digit number and tens



Adding two 2 digit numbers



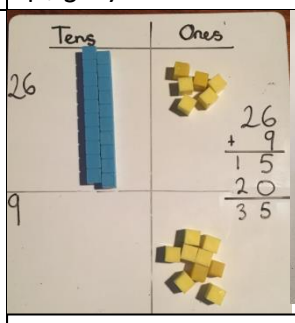
Partitioning numbers:

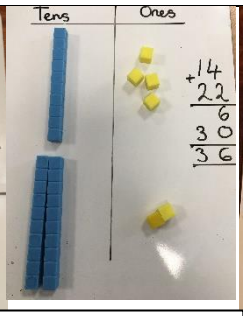
34 + 23 = 57

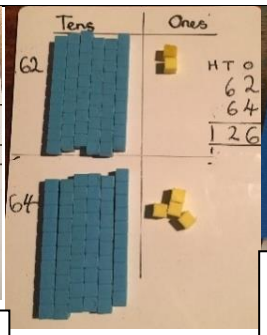
30 + 20 = 50

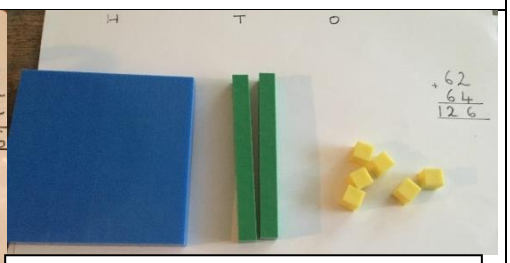
4 + 3 = 7

Images of manipulatives used to undertake column addition.







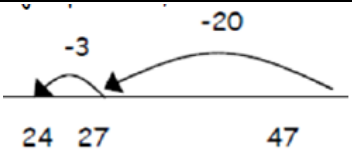


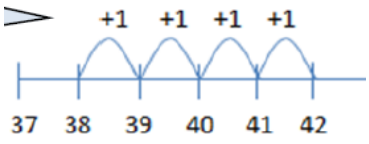
Move on to short column addition method.

Add the ones and put under the line.
6+9=15.
Then add the tens. 20+0=20
Finally, add the two answers=15+20=35

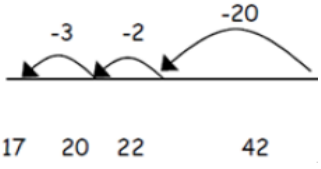
Year 2 Subtraction

Children will learn to read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs. Represent and us A two digit number and ones - A two digit number and tens - Add two two-digit numbers - Adding three one digit numbers





Once children develop their confidence they will be able to select more efficient problem and will not have to partition numbers separately. Once confident jumps, children are ready to subtract by

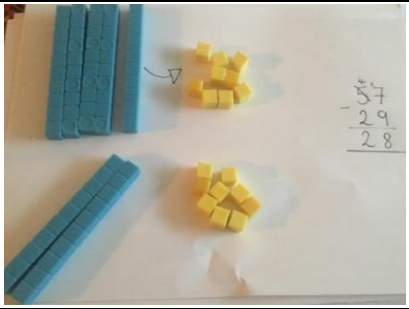


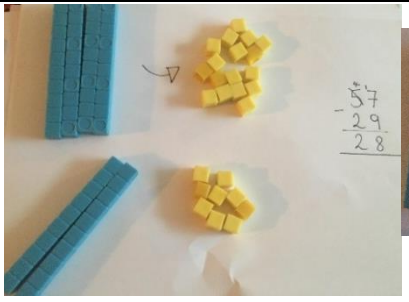
of counting back jumps to solve a the tens and units with efficient bridging through 10, again partitioning is very important here and the children will need to be very confident with partitioning in different ways

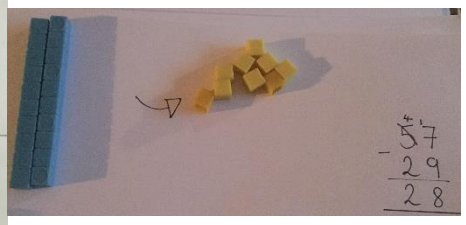
Use manipulatives to break numbers into parts for subtraction strategies.

Concrete/ Pictorial representations

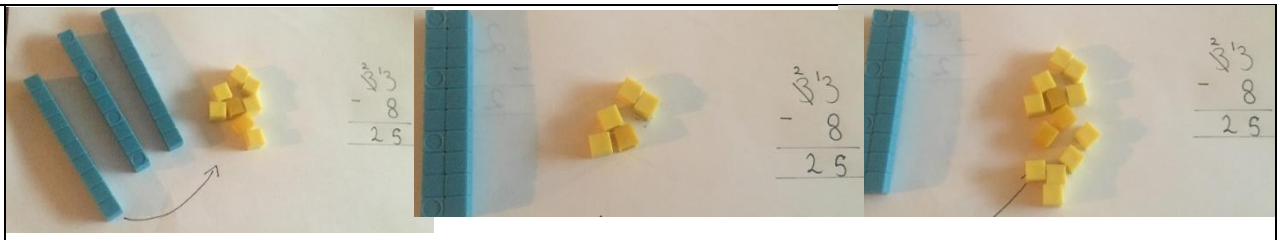
2 by 2 digits







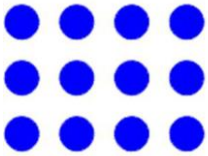
2 by 1 digit number

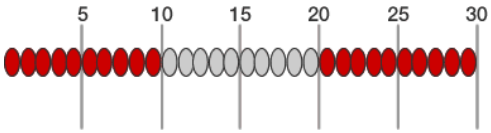


Multiplication Year 2

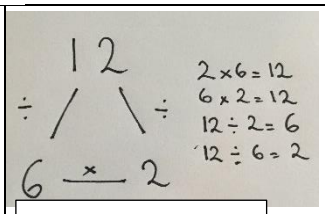
Children will learn to recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

Rapid recall of 2,5 and 10 times tables

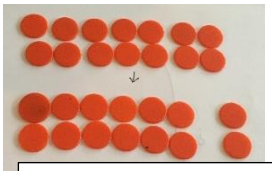




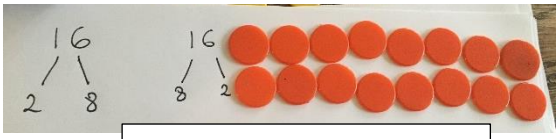
Concrete and visual resources



X and division facts.



Use knowledge of 2, 5 & 10 times tables to work out multiples of 7.
7x2=(5+2)x2=(5x2)+(2x2)=10+4=14



Break number into factors.

Progression into written problems…

Each child has picked 4 flowers. How many flowers will 3 children have altogether? The fixed number is 4 It is being multiplied by 3. 4x 3 = 12 (3 children will have 12 flowers altogether)

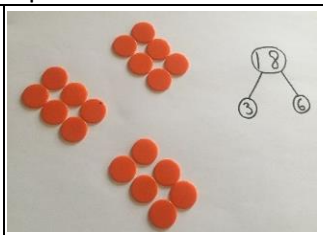
Division Year 2

Children will learn to solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

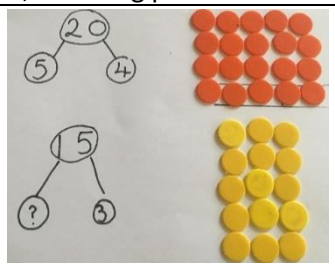
Finding factors

Finding missing factors.

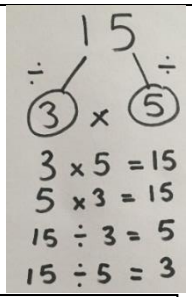
Exploring number families.



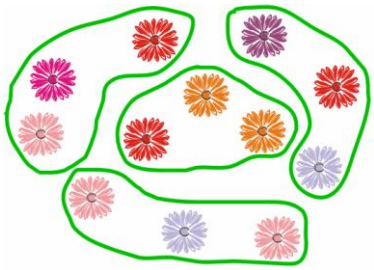
Using arrays to split numbers into their factors.



Use arrays to find missing factors.



Explore number families.



Divide objects up into equal groups.

Year 3 Addition

Children will learn to add a three digit number and tens without regrouping. To add 2 three-digit numbers without regrouping .To add three-digit numbers with regrouping. To add using place value counters. To develop and recognise patterns in addition. To estimate the answer to a calculation. To solve word problems

Partitioning

246 + 132 = 378

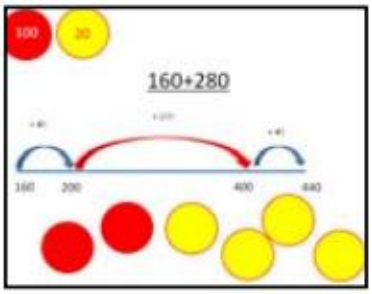
Introduce the partitioning column method with numbers that do not bridge so children become confident with the method itself.

200 + 40 + 6
100 + 30 + 2
300 + 70 + 8 = 378

337 + 188 = 525

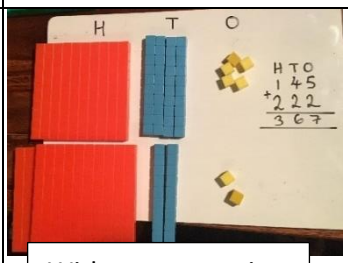
Once confident, children can start using the partitioning column method to solve problems that bridge the tens and hundreds boundaries.

300 + 30 + 7
100 + 80 + 8
400 + 110 + 15 = 525

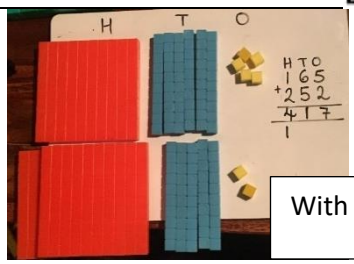


Written addition

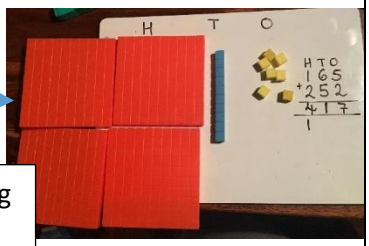
TU + TU
HTU + TU
HTU + HTU



Without regrouping



With regrouping



Year 3 Subtraction

Children will learn to subtract a three-digit number and ones - A three- digit number and tens - A three- digit number and hundreds 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.

Formal written methods

(1)Extended columnar - no exchange

Extended method 87 - 53 =

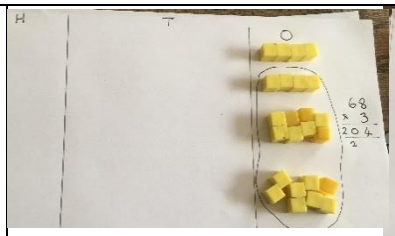
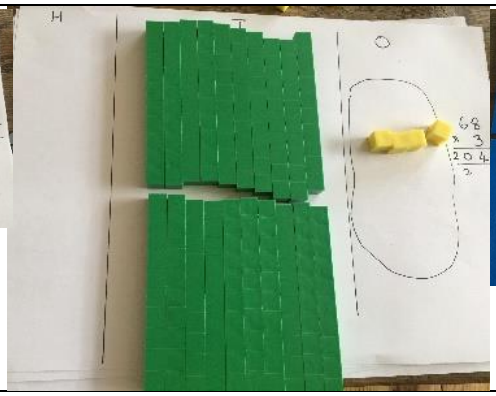
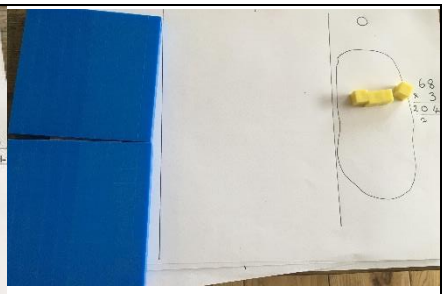
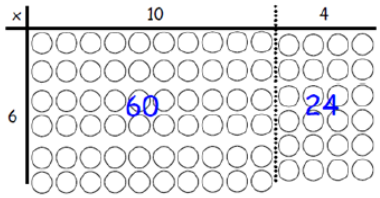
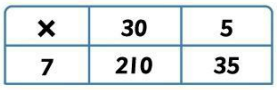
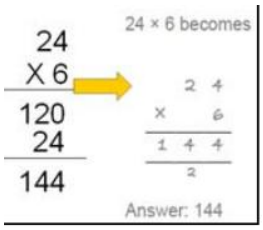
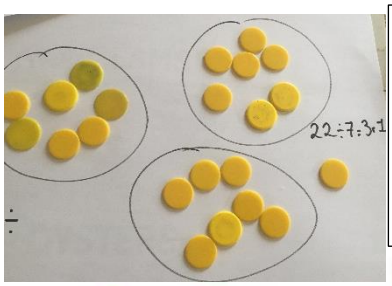
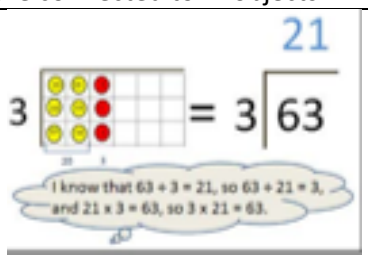
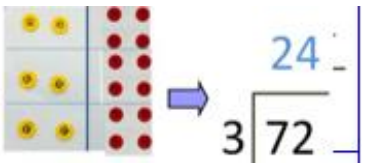
80 and 7
- 50 and 3
30 and 4 = 34

(2) Extended columnar – with exchange:
87-58 becomes
70 +1 7
-50 + 8
20 + 9

8 1
2 9 3
-1 5 4
1 3 9

Multiplication Year 3

Children will learn to use multiplication and division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication and division using the multiplication tables 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.

Multiplication with regrouping using concrete resources	  
Grid methods, expanded method and short column.	  210 + 35 = 245  Introduce grid method using arrays. Move on to grid just using partitoning techniques. Make the link to expanded method Finally, short multiplication method. Estimate before calculating to develop number fluency. Ensure written methods build on or relate to mental methods.
Division Year 3	
Children will learn to 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.	
Concrete resources, moving into formal written method.	 Dividing with remainders. Using sharing circles with manipulatives to work out remainders.   

Year 4 Addition

Children will learn to 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 word problems in context, deciding which operations and methods to use and why.

Written methods

HTU + HTU
ThHTU + HTU
ThHTU + ThHTU

Use place value coins to represent numbers and use exchanging to reinforce understanding of place value.
Example: 5+6 ones = 11, therefore there is one, one and one tens to be regrouped into the tens column.

Compact vertical

789 + 642 =

$$\begin{array}{r} 7\ 8\ 9 \\ +\ 6\ 4\ 2 \\ \hline 1\ 4\ 3\ 1 \\ \hline 1\ 1 \end{array}$$

1431

If not secure, children must use expanded methods a

Include decimal addition for money.

Year 4 Subtraction

Children will learn to 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 word problems in context, deciding which operations and methods to use & why.

Progression into written methods

Subtract numbers with up to four digits, using formal written methods of columnar subtraction.
Build on formal, extended method (*see year 3)* using exchange wherever necessary.
Continue to use representations and manipulatives to develop understanding of place value.

$$\begin{array}{r} 300 + \overset{60}{\cancel{70}} + \overset{1}{\ } 2 \\ -\ 100 + 40 + 7 \\ \hline 200 + 20 + 5 \end{array}$$

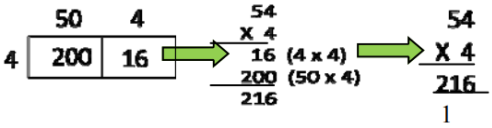
$$\begin{array}{r} \overset{6}{\ } \\ 13\cancel{7}^{1}4 \\ -\ 968 \\ \hline 406 \end{array}$$

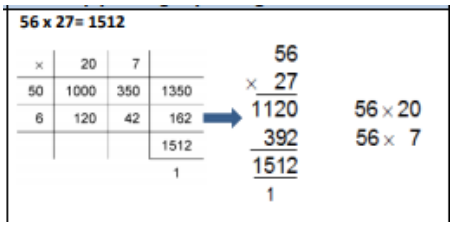
Multiplication Year 4

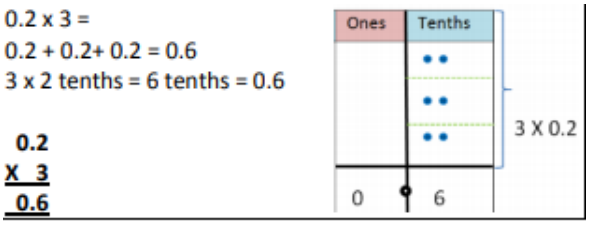
Children will learn to recall multiplication and division facts for multiplication tables up to 12 × 12. Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply 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 into written methods.

To multiply a 2 digit number by a 1 digit number
To multply a 3 digit number by a 1 digit number
To multiply a 2 digit by a 2 digit number

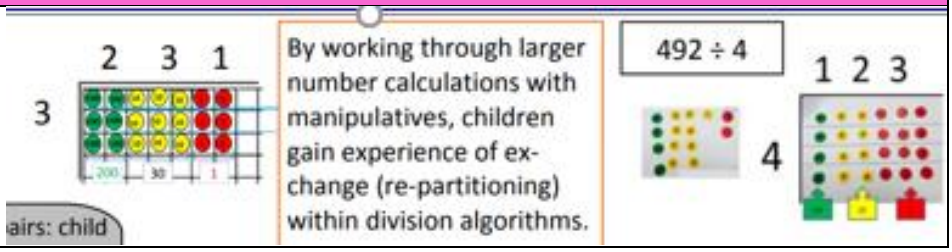






Division Year 4

Formal written method

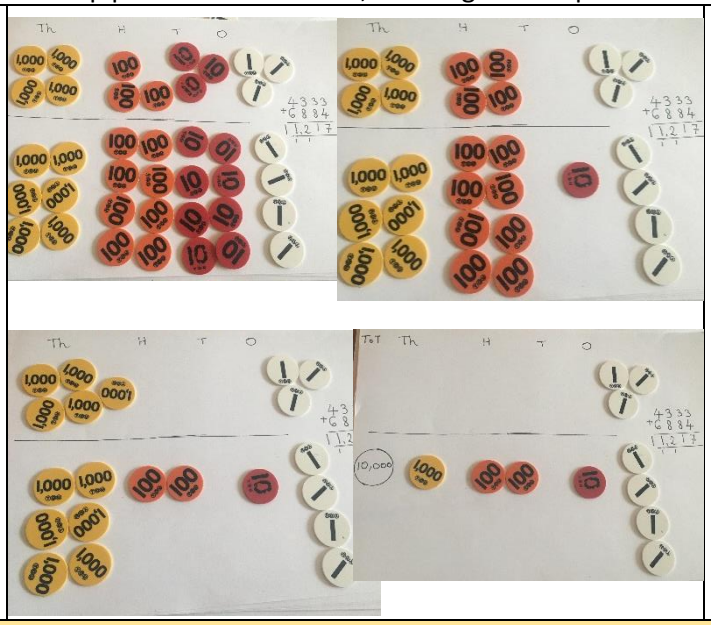


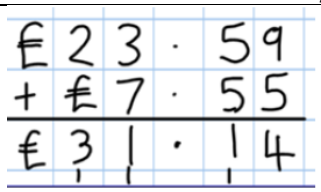
Year 5 Addition

Children will learn to add and subtract whole numbers with more than 4 digits, including formal written methods (columnar addition and subtraction). Add and subtract numbers mentally with increasingly large numbers. 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.

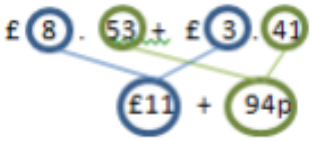
Add whole numbers >4 digits, including using **formal** written methods (**columnar addition**).

Decimals up to 2dp
(eg 72.5 + 45.7)



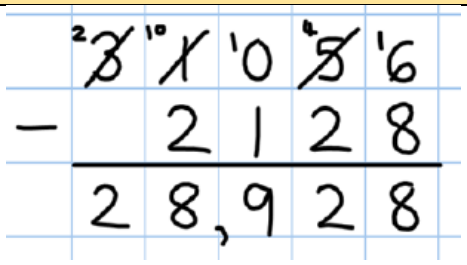


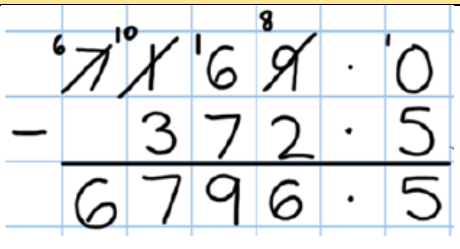
Adding decimals including using part part whole method.



Year 5 Subtraction

Progression to written method





Multiplication Year 5

Children will learn to 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 (nonprime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. 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. Multiply numbers mentally drawing upon known facts. Multiply whole numbers and those involving decimals by 10, 100 and 1000

Progression into written methods Up to 4 digits by 1. Use of expanded method.

2741 x 6 = 16446

	2	7	4	1
×				6
1	6	4	4	6
	4	2		

(estimate 3000 x 6 = 18000)

	H	T	U	
	2	4	7	
x		3	2	
		1	4	2 x 7
		8	0	2 x 40
	4	0	0	2 x 200
	2	1	0	30 x 7
1	2	0	0	30 x 40
6	0	0	0	30 x 200
7	9	0	4	
	1			

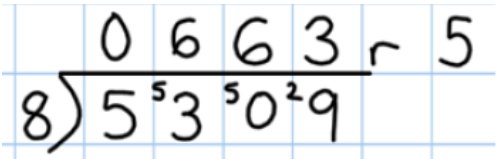
96
32 x
192 ⇐ this is 96 x 2
2880 ⇐ this is 96 x 30
3072 ⇐ this is 96 x 32

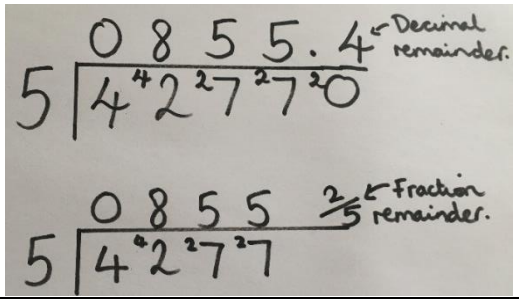
Division Year 5

Children will learn to 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 (nonprime) numbers. Establish whether a number up to 100 is prime and recall prime numbers up to 19. Multiply and divide numbers mentally drawing upon known facts. 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. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3). Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Progression into written methods

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.





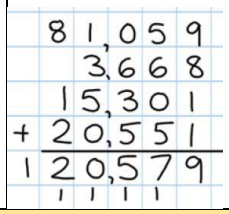
Year 6 Addition

Children will learn to perform mental calculations, including with mixed operations and large numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations 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. Use estimation to check answers to calculations and determine, the in context of a problem, an appropriate degree of accuracy.

Expanded vertical
3.243 + 18.070 = **21.313**

```
  3.243
+ 18.070
  0.003
  0.110
  0.200
 21.000
 21.313
```

Children need to use their knowledge of the decimal point to line up their amounts correctly in the column. Zeroes should be added to support place value, showing that there is no value to add.



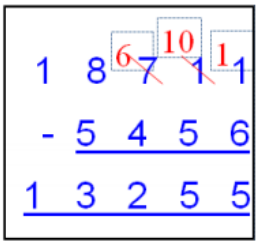
£563.14
+ £207.88
£771.02
1 1 1

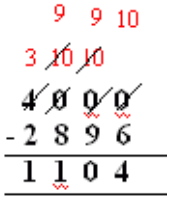
Use symbols as numbers to stretch children's problem solving skills.

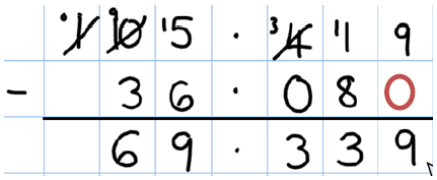
Year 6 Subtraction

Children to perform mental calculations, including with mixed operations and large numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations 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. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Subtract whole numbers with more than four digits using the formal written columnar method.
Practise subtracting numbers including decimals.



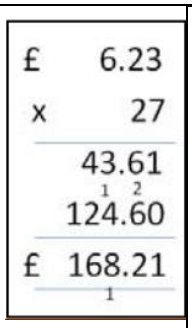




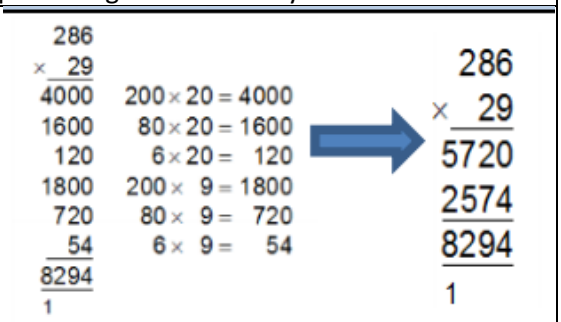
To solve any subtraction with numbers to 2 decimal places.

Multiplication Year 6

Children to multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. Perform mental calculations, including with mixed operations and large numbers Identify common factors, common multiples and prime numbers. Use their knowledge of the order of operations to carry out calculations involving the four operations. Solve problems involving addition, subtraction, multiplication and division. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.



When multiplying decimals children often find it easier to take decimals out, perform the long or short multiplication, then put in the decimal point after. How ever many digits are after the decimal place in the original numbers is where to put the decimal point in the answer.



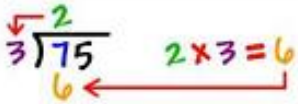
Division Year 6

Children will learn to divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Children will perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers Use their knowledge of the order of operations to carry out calculations involving the four operations.

Written methods and Remainders	**Divide numbers up to 4 digits by a two-digit number using** **the formal written methods of long and short division and** **interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.**	To divide by 2 digit numbers, the children will use the method of long division. The example to the left clearly shows the method in the 'Burger' steps, whereas the example to the right shows what a completed method would look like. Any remainders would need to be expressed in a way that matched the context of the problem.

Divide:

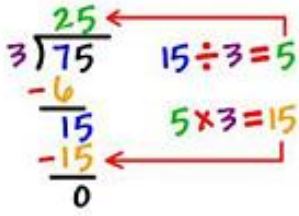
Multiply:



Subtract:

Bring Down:

Repeat:



$$
\begin{array}{r}
291 \\
45\overline{)13095} \\
\underline{90} \\
409 \\
\underline{405} \\
45 \\
\underline{45} \\
0
\end{array}
$$