St George's Catholic Voluntary Academy

Mathematics calculation Policy

National Curriculum Expectation The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

CPA approach

To support children with their calculating, the CPA approach will be adopted in all year groups. C stands for concrete, meaning children have access to manipulatives to support their working out, such as place value counters or numicon. P stands for pictorial, so children start to use visual representations such as bar models. A is abstract where children can confidently calculate without the use of concrete or visuals to support.

Calculating at St Georges

Each year group is split into 2 main parts: calculating and column methods.

Calculating

Following the calculation phase of Big Maths "CLIC" means the children will gain a high understanding of calculating skills. Children are required to master many high understanding steps before they learn column methods.

One of the key teaching strategies from Big Maths is to provide children with a "brain only" way of solving problems. This is taught following a deliberate and strong structure. It happens through a 3

part process: F is for Full: Each process starts with the full written method that is high on understanding. A is for Abridged: Gradually, the writing is taken the writing away, therefore training the children to hold numbers in their heads. B is for Brain: The children are then left with the ability to solve the equation with nothing except their brains.

Column Methods

Each operation has a corresponding "column method". These are taught as much more efficient methods and complement the high understanding methods of CLIC. They should only begin after children have secured the high understanding steps as follows:

- Addition: after Step 14
- Multiplication: after Step 11
- Subtraction: after Step 27
- Division: after Step 19

Language and representations/structures:

In order for children at St George's to become secure in their calculations and mathematical working, they need to be able to use the correct language and understand different representations and structures. Below, each calculation has screen shots, and key vocabulary that have been taken from Big Maths, as well as the July 2020 government guidance. They demonstrate what children need to be taught in each year in order to progress successfully through the curriculum. It provides examples of key vocabulary and sentence stems that children should be using when engaging in mathematical talk.

Addition

Reception and Year 1

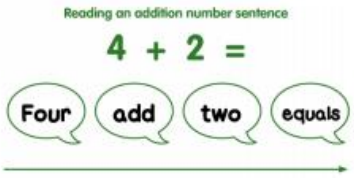
Big Maths Addition steps	Big Maths Column Method steps
1 – 12	

The first phase of addition covers the high-understanding foundations that allow children to progress smoothly from understanding what addition is to being able to add 1-digit numbers to 20.

Children start by counting a variety of objects practically to find the total, e.g.

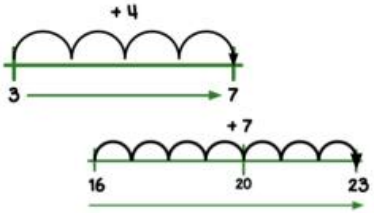
"How many altogether?"

Then they begin to read and understand number sentences



In year 1, they move on to solving addition problems on a number line.

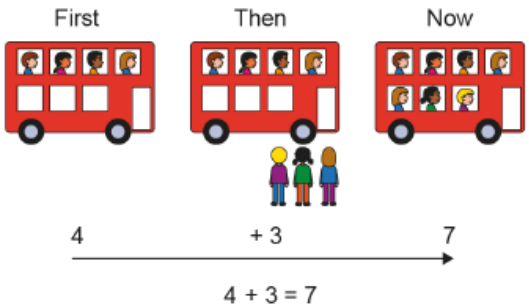
3 + 4 = 16 + 7 =



First... Then... Now...

E.g. **First** there were 4 children on the bus, **then** 3 children got on, **Now** there are 7 children on the bus.

How many children are on the bus now?



As part of the addition process, children should be secure in knowing their number bonds to 10 by the end of year 1. This is taught through learn its and using tools such as tens frames and numicon.

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8		
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7			
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6				
5	5+0	5+1	5+2	5+3	5+4	5+5					
6	6+0	6+1	6+2	6+3	6+4						
7	7+0	7+1	7+2	7+3							
8	8+0	8+1	8+2								
9	9+0	9+1									
10	10+0										

I need ____ to make ten. I have ____ left over. 10 + ___ is _____.

Year 2

Big Maths Addition steps	Big Maths Column Method steps
13 – 24	1

Calculating

In year 2, children are taught to solve addition problems by partitioning the 2-digit number to add a 2-digit and a 1-digit number and, by the end of the year, to add two 2-digit numbers.

Initial steps of adding 1 and 10 to a 2-digit number build children's confidence in addition and encourage use of 'brain only' methods.

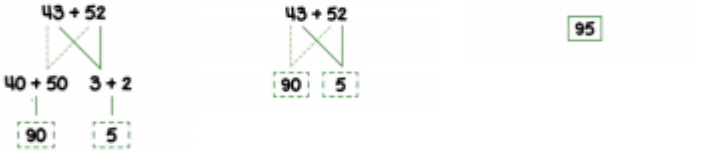
28 + 1 =

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

40 + 10 =

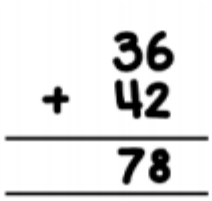
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

The children progress to adding a 2-digit number to another without crossing 100. Children start with the full written method and move to brain only using the FAB maths principle

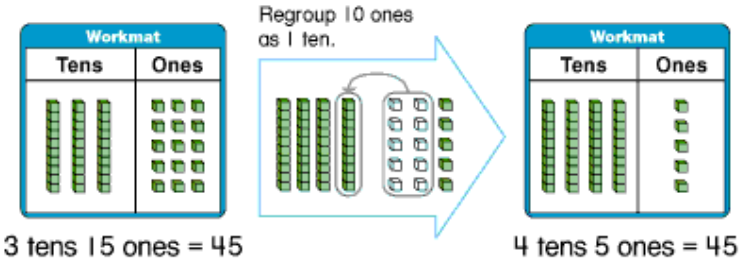


Column methods

After finishing the addition steps, children are introduced to a column method. The children are not 'crossing 10' with the total of each column, hence they are solving a 2d + 2d question but not any 2d + 2d question.

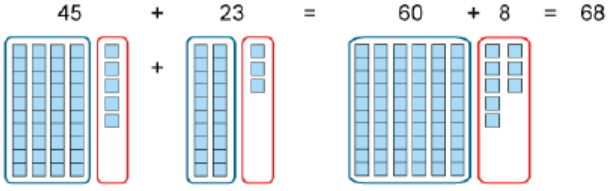


Visual representations to support the adding of tens and ones, base 10:



First I partition…. Then I add the ones…. Then I add the tens…. Then I combine them….

- $40+20+5+3=60+8=68$
- $40+5+20+3=60+8=68$
- $45+23=60+8=68$



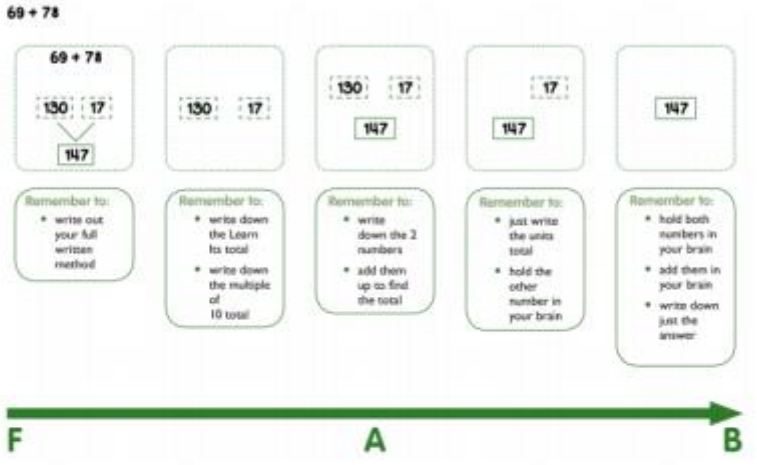
The___ is in the ones column, it represents ___ one(s).The ___ is in the tens column, it represents _____ ten(s)

Year 3

Big Maths Addition steps	Big Maths Column Method steps
25 – 28	2 – 6

Calculating

The method of partitioning to add 2-digit numbers together continues into year 3 to add *any* two 2-digit numbers crossing 100.

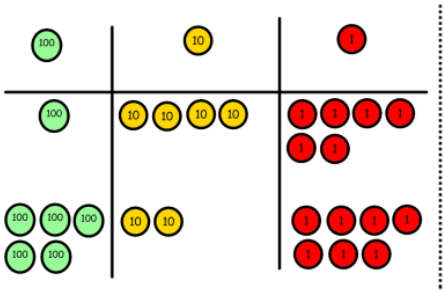


Children are then taught progressively so that by the end of the year, the can solve 3-digit add 3-digit numbers not crossing 1000.

Column methods

The column methods steps build on the calculation steps. The children learn to 'carry the 10' and, later on in year 3, apply this to adding 3-digit numbers carrying the 100 (beginning to cross 1000).

$$\begin{array}{r} 76 \\ +\ 48 \\ \hline 124 \\ \hline 1 \end{array} \qquad \begin{array}{r} 686 \\ +\ 549 \\ \hline 1235 \\ \hline 1\ 1 \end{array}$$



$$\begin{array}{r} 146 \\ +\ 527 \\ \hline \end{array}$$

If the column sum is equal to ten or more, we must _____.

We need to exchange ten ones for one ten.

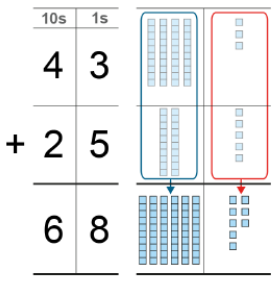


Figure 81: columnar addition with no regrouping: calculation and Dienes representation

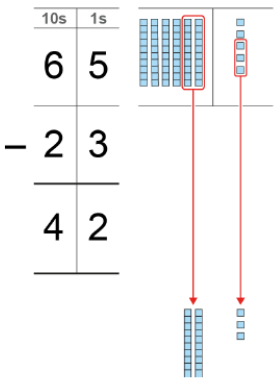


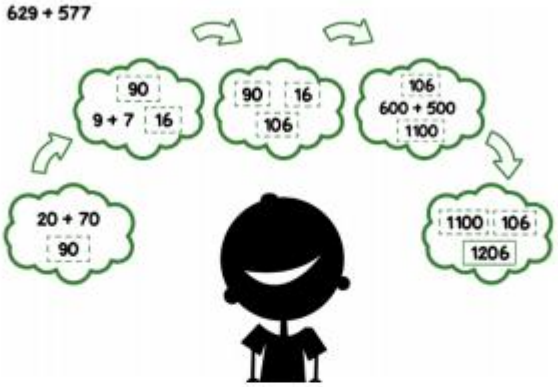
Figure 82: columnar subtraction with no exchange: calculation and Dienes representation

Year 4

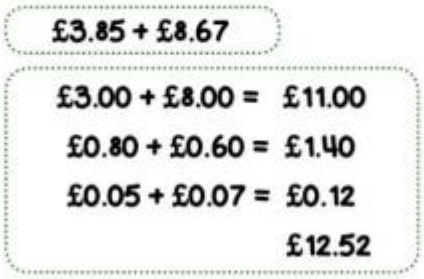
Big Maths Addition steps	Big Maths Column Method steps
29 – 31	7 – 8

Calculating

Addition of 3-digit numbers extends to adding *any* two 3-digit numbers including crossing 1000.

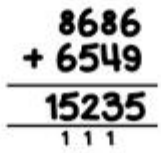


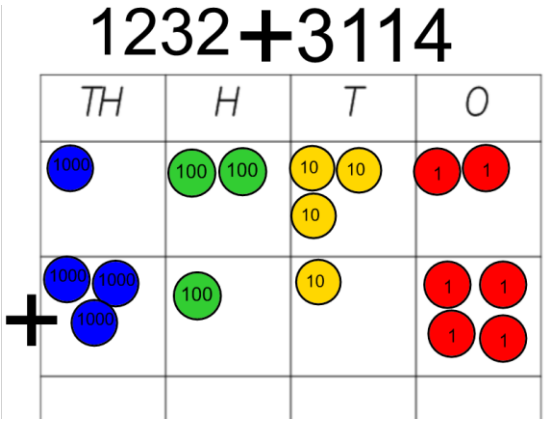
The focus then moves on to the 3-digit addition of money which introduces decimal addition.



Column methods

In year 4, column methods progress to adding *any* two 4-digit numbers.

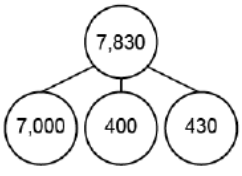




Using equipment such as place value counters to support with adding across different place values.

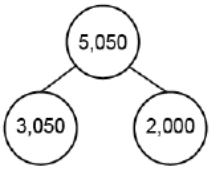
If the column sum is equal to ten or more, we must exchange.

We need to exchange ten ones for one ten.



7,830 – 400 = 7,430

Figure 107: partitioning 7,830 into 7,430 and 400



2,000 + 3,050 = 5,050

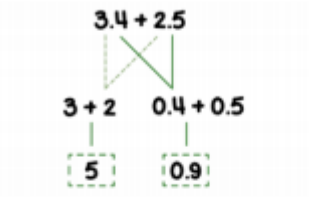
Figure 108: partitioning 5,050 into 2,000 and 3,050

Year 5

Big Maths Addition steps	Big Maths Column Method steps
32 – 38	9 – 10

Calculating

Children are taught to add two 1dp numbers (<1) without, and then with, crossing boundaries, progressing to solving any additions with 2dp by the end of year 5.



Also included in year 4 is solving addition with larger numbers, teaching children that sometimes they can 'whizz along the columns' rather than mentally partitioning.

$$\begin{array}{r} 849302 \\ +\ 130557 \\ \hline \end{array}$$

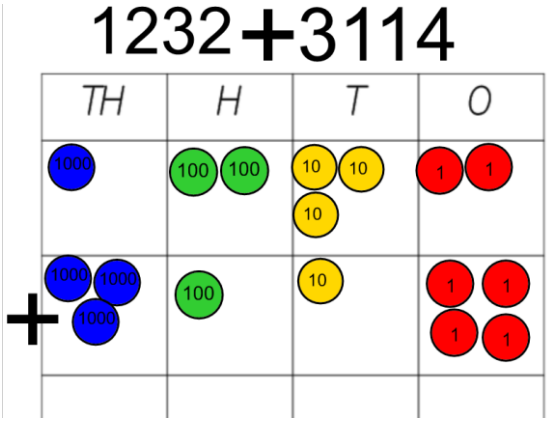
Column methods

Children are taught to use column methods to add several numbers together. The key teaching point here is to provide questions where the numbers are not presented in columns and children are required to 'set up' the question. The emphasis is then placed on setting up the question by aligning the units digits in a straight line and keeping the other respective digits in their correct columns also.

$$\begin{array}{r} 868 \\ 582 \\ +\ 654 \\ \hline 2104 \\ \hline 2\ 1 \end{array}$$

Children are also taught to add two 5-digits numbers cross the 100000.

$$\begin{array}{r} 81686 \\ +\ 66549 \\ \hline 148235 \\ \hline 1\ 1\ 1 \end{array}$$



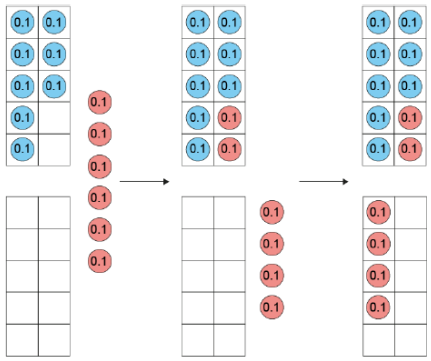


Figure 172: tens frames with 0.1-value counters showing 0.8 + 0.6 = 1.4

8 + 6 = 14 | 14 – 6 = 8 | 14 – 8 = 6

0.8 + 0.6 = 1.4 | 1.4 – 0.6 = 0.8 | 1.4 – 0.8 = 0.6

Year 6

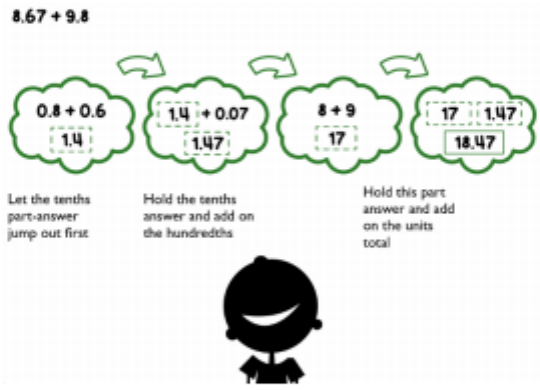
Big Maths Addition steps	Big Maths Column Method steps
39 – 41	11 – 14

Calculating

Children are taught to add several numbers using column methods in their minds.

$$\begin{array}{r} 123 \\ 314 \\ 20 \\ +\ 341 \\ \hline \end{array}$$

Then teaching progresses through solving 2dp + 1dp (without crossing boundaries) to solving *any* 2dp + 1dp.



Column methods

In year 6 children are taught to use a column method to add decimal numbers up to 3dp.

$$\begin{array}{r} 8.686 \\ +\ 6.549 \\ \hline 15.235 \\ \hline \end{array}$$

1 1 1

$$\begin{array}{r} 8.689 \\ +\ 6.54 \\ \hline 15.229 \\ \hline \end{array}$$

1 1

1s	•	$\frac{1}{10}$s	$\frac{1}{100}$s	$\frac{1}{1000}$s	
○○		○○○	○	○○○○○	2.316
○		○○○○	○○○○○	○○	1.472
					3.788

Using place value counters to support when

Adding decimal numbers.

Subtraction

Reception and Year 1

Big Maths Subtraction steps	Big Maths Column Method steps
1 – 12	

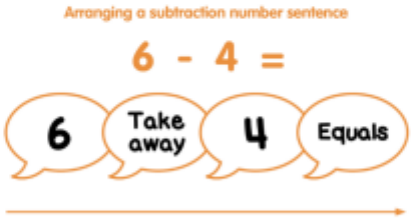
Calculating

The first phase of subtraction teaches the children to subtract by counting backwards, starting off with counting and then drawing on shortcuts learnt for counting. At the end of year 1, children will be able to take 1-digit numbers away from 20.

Children start by physically taking objects away to find out how many are left.

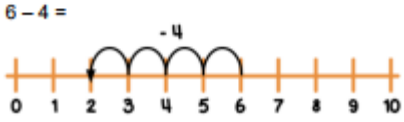
"How many are left?",

They then begin to read and understand subtraction number sentences,

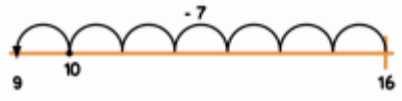


and move on to solving subtraction problems on a number line.

6 – 4 =



16 - 7 =



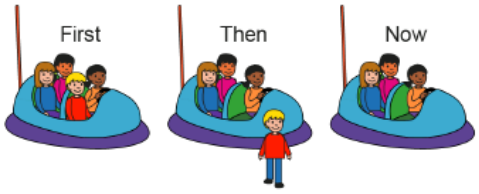
Use a number track subtract a single digit number from 20

17 – 3 = 14

Repeat using a bead string

Repeat using a number line

How many children are in the bumper car now?



4 – 1 = 3

First... Then... Now...

e.g. **First** there were 4 children in the car, **then** 1 child got out, **Now** there are 3 children in the car.

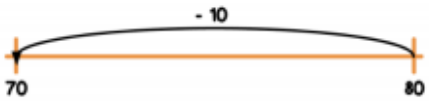
Year 2

Big Maths Subtraction steps	Big Maths Column Method steps
13 – 24	1

Calculating

In year 2, as well as developing counting backwards to give a high understanding of the number system, children are taught to find the difference.

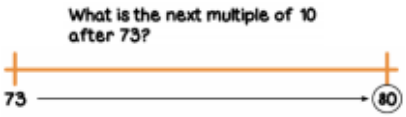
During Spring and Summer term children are taught to count backwards to subtract multiples of 10, 1-digit numbers away from multiples of 10 and, eventually, solve *any* 2-digit – 1-digit problem.



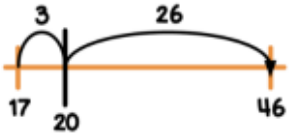
43 - 10 =

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

At Step 19, in the Summer term, the focus changes to finding the difference or 'finding the gap'. Children work through the steps finding the next multiple of 10 to being able to solve *any* 2-digit - 2-digit problem.



46 - 17 =

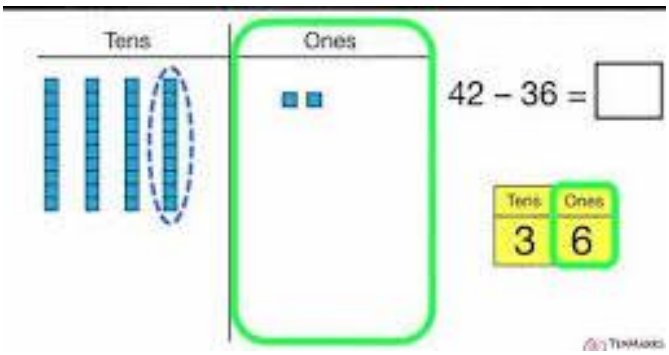


"Swap, stop, jump, jump, add"

Column methods

After finishing the subtraction steps, children are introduced subtraction with 2-digit numbers using a column method. Children are taught to subtract two 2-digit numbers without borrowing.

$$\begin{array}{r} 96 \\ -\ 42 \\ \hline 54 \end{array}$$



Modelling subtracting tens through the use of base ten blocks.

The bigger number is _____ so that goes at the top.

Take away the _____, then takeaway the _____.

Finding the difference using bar models

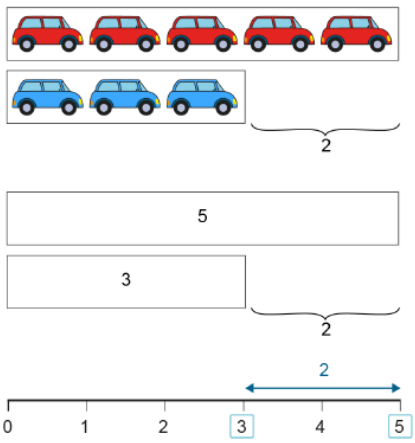


Figure 48: finding the difference – bar model and number line

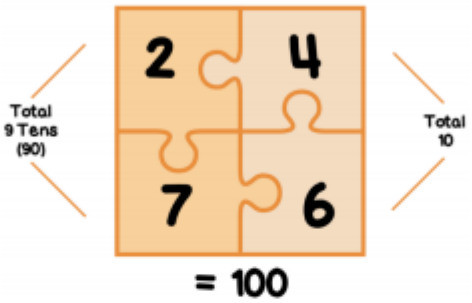
Year 3

Big Maths Subtraction steps	Big Maths Column Method steps
13 – 24	1

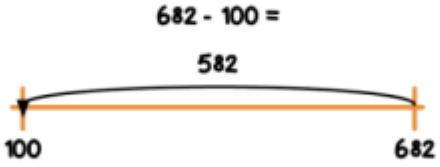
Calculating

Children are taught how to subtract any 2-digit number from 100, linking to facts they know, and how to subtract with 3-digit numbers.

Children are taught to subtract any 2-digit number from 100 using the difference.

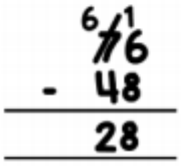


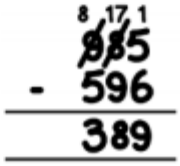
They then move to subtracting 100 from 3-digit numbers.

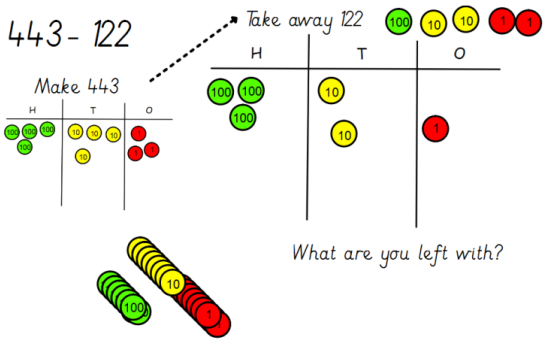


Column methods

The subtraction column methods steps are built on the calculation steps. The children learn to 'borrow 10' from the tens digit and, later on in the year, apply this knowledge to subtracting 3-digit numbers with 'borrowing'.







The ones column represents ___ one (s) minus _____ ones (s). This is equal to ___ ones.

(repeat with tens, hundreds, etc)

Identifying core number facts: columnar addition	Identifying core number facts: columnar subtraction
4 6 5 + 4 2 9 8 9 4 1 Figure 72: columnar addition of 465 and 429	6 1 7 4 9 – 2 8 6 4 6 3 Figure 73: columnar subtraction of 286 from 749
Within-column calculations: 5 + 9 = 14 6 + 2 + 1 = 9 4 + 4 = 8	Within-column calculations: 9 – 6 = 3 7 – 1 = 6 14 – 8 = 6 6 – 2 = 4

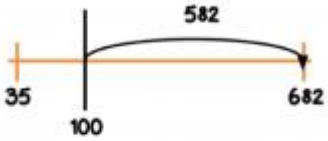
Children recalling key number facts to support column methods

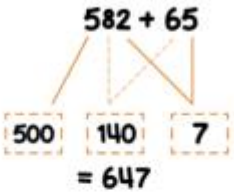
Year 4

Big Maths Subtraction steps	Big Maths Column Method steps
30	6 – 7

Calculating

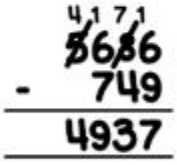
In year 4, children are taught to solve 3-digit - 2-digit problems making sure, by the end of the year, children will be able to do this 'brain only.



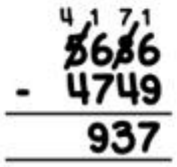


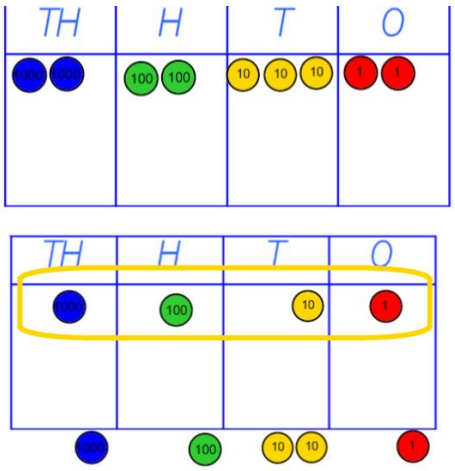
Column methods

Children now apply their knowledge of 'borrowing', from year 3, and apply this to 4-digit numbers - 2- or 3-digit numbers.



They then further this knowledge by subtraction 4-digit numbers from 4-digit numbers with 'borrowing'.





The ones column represents ___ one (s) minus _____ ones (s). This is equal to ___ ones.

(repeat with tens, hundreds, etc)

Tom uses the place value chart to

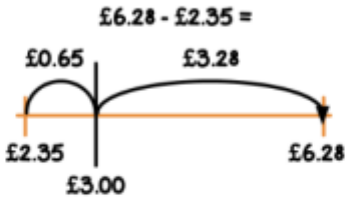
Year 5

Big Maths Subtraction steps	Big Maths Column Method steps
31 – 36	8

Calculating

The method of finding the difference continues into year 5 where children are taught to solve 4-digit – 2-digit problems then, similar to addition, learn to subtract decimal numbers.

They are introduced to decimal places by using the context of money.

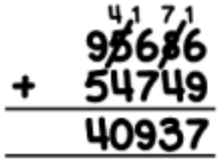


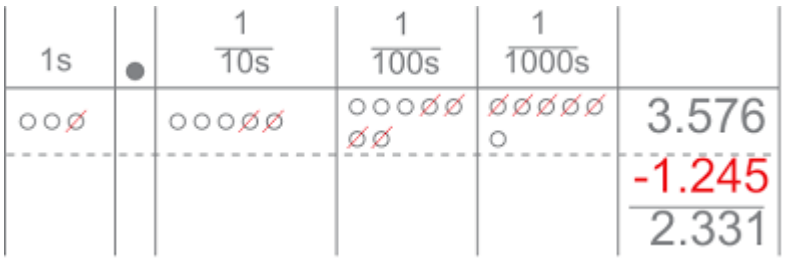
This progresses to subtracting numbers with hundredths and then tenths.

Finally children are taught to solve subtraction problems with large numbers where all the methods are drawn on. The focus here is on making sure children can use 'brain only' methods.

Column methods

Children learn to subtract two 5-digit numbers using column subtraction methods. This develops their previous knowledge of subtracting 4-digit numbers.



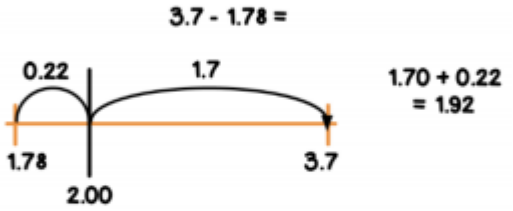


Year 6

Big Maths Subtraction steps	Big Maths Column Method steps
37	9 – 12

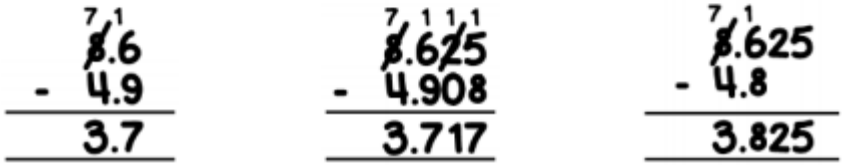
Calculating

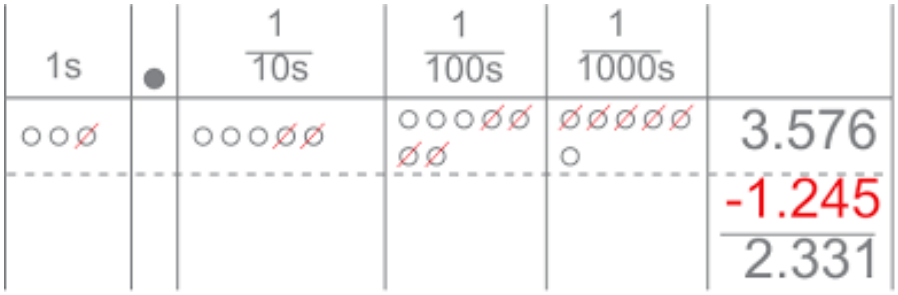
This is the final step of subtraction. Children are taught how to subtract numbers with different decimal places in term 1 of year 6. They use the 2-jump approach taught in the previous steps and apply it to different decimal place subtraction.



Column methods

By this time, children are comfortable with decimal numbers with up to 3dp. Children are taught to subtract numbers with 1, 2 and 3 decimal places, and then with mixed amounts of decimal places.





Multiplication

Reception and Year 1

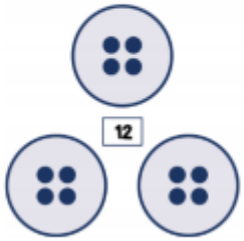
Big Maths Multiplication steps	Big Maths Column Method steps
1 – 6	

Calculating

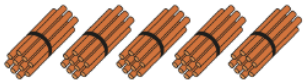
Children will progress from setting out groups of toys (concrete) when they are playing at the beginning of reception to setting out, and counting up, groups of dots (pictorial) at the end of year 1

Children move from setting out groups of toys to setting out blocks.

They will be taught to draw them as dots and find the total number of dots.



2. These sticks are grouped into bundles of 10. How many sticks are there altogether?



3. How many wheels are there altogether? Count in groups of 2.

4. There are 5 hedgehogs in each group. How many hedgehogs are there altogether?

Using a variety of pictures or objects to represent equal groups. Children use knowledge of 2s,5s and 10s to count the total.

We are counting in multiples of _____

There are _____ groups

Each group has _____

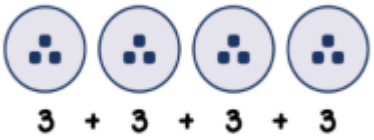
In total there are _____

Year 2

Big Maths Multiplication steps	Big Maths Column Method steps
7 – 9	

Calculating

In year 2 children are taught how to write and solve multiplication as a repeated addition problem. They are first taught how to read multiplication number sentences and convert them into addition sentences. This shows a focus on high understanding.



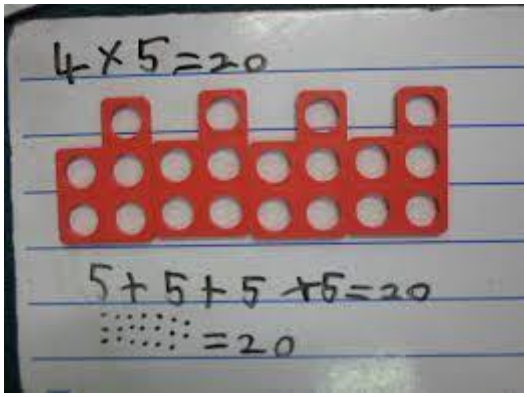
3 + 3 + 3 + 3

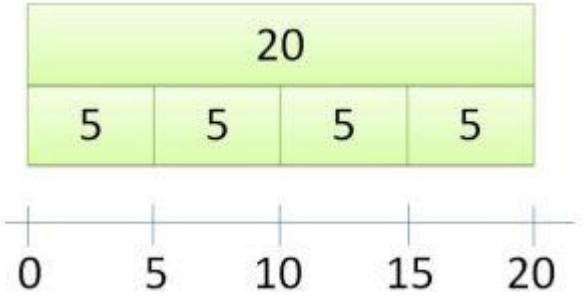
5 x 2 =

2 + 2 + 2 + 2 + 2

Children will learn their 2, 5 and 10 times tables and apply this knowledge to solving multiplication problems.

3 A box of cherries costs £2. I want to buy 5 boxes. How much does that cost?





Bar model to show repeated addition and equal parts to make the whole. When we multiply we have many parts to make our whole amount.

There are _____ in each group. There are _____ groups. We have to add _____ _____ times.

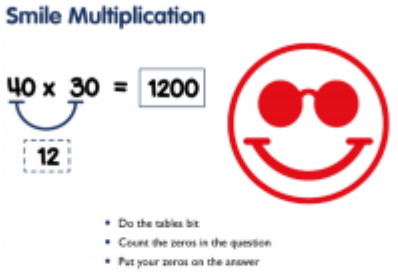
Year 3

Big Maths Multiplication steps	Big Maths Column Method steps
10 – 11	1

Calculating

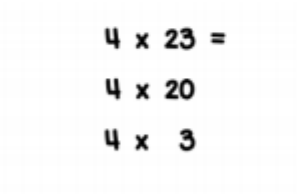
The children are taught more formal methods of solving multiplication problems including 'Smile Multiplication'.

They are taught to use the smile method of multiplication using the full written method and moving to 'brain only' calculations.

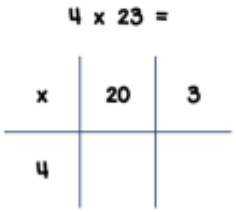


This is then applied to multiplying a 1-digit number by a 2-digit number (using only 2, 3, 4, and 5 times tables). They are introduced to 3 ways of showing their workings:

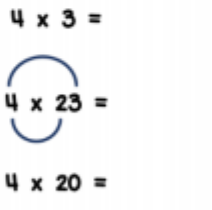
1. As two number sentences



2. As a grid

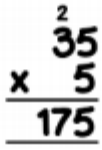


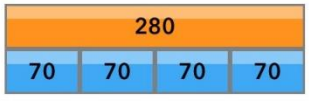
3. As informal jottings



Column methods

Once the children have the completed the calculation steps and their understanding is secure, they will be taught to solve 2-digit x 1-digit numbers using column methods (multiplying only by 2, 3, 4, or 5).





Using bar models and place value to work out longer multiplication questions. Making connections with known multiplication facts.

Figure 76: 3-by-5 array of 10-value place-value counters

_____ can be partitioned into _____ and _____.
_____ lots of ___ ones is _____.
_____ lots of _____ tens is _____.

_____ ones add _____ tens is _____.

$3 \times 5 = 15$
$3 \times 50 = 150$

$3 \times 5 = 15$
$30 \times 5 = 150$

Year 4

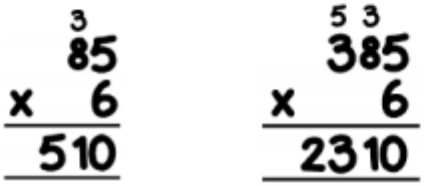
Big Maths Multiplication steps	Big Maths Column Method steps
12 – 14	2 – 3

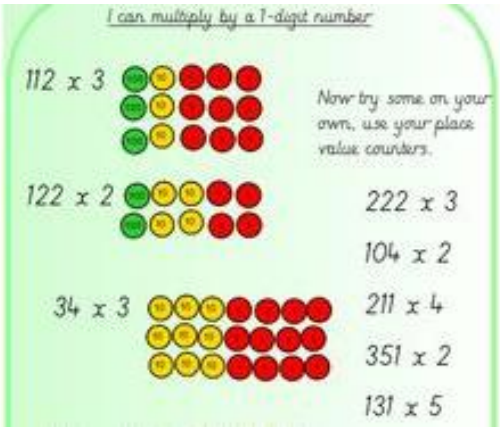
Calculating

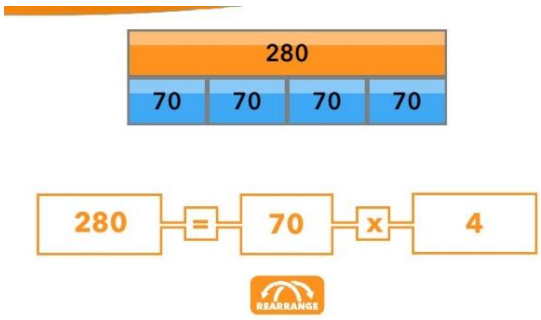
At this point, children are taught to multiply any 1-digit numbers. The children will have instant recall of the multiplication facts from the 'Learn Its' strand.
They are then taught to do any 'Smile Multiplication', working from a full written method to a 'brain only'.

Column methods

Children will be taught to solve any 2-digit x 1-digit in the Spring term and move on to solving any 3-digit x 1-digit number by the end of the year. This will be taught after the relevant calculation step taught in that term.







_____ can be partitioned into _____ and _____.
_____ lots of ___ ones is _____.
_____ lots of _____ tens is _____.

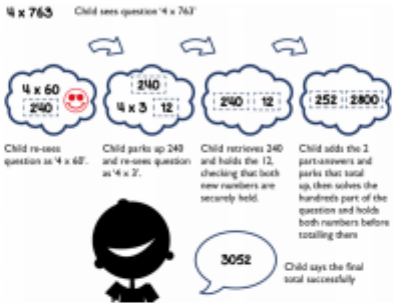
_____ ones add _____ tens is _____.

Year 5

Big Maths Multiplication steps	Big Maths Column Method steps
15 – 16	4 – 6

Calculating

Children will be taught how to solve 1-digit x 3-digit multiplication problems and their understanding of 2-digit x 2-digit problems is developed.
Children move from completing the full written method of 1-digit x 3-digit problems to completing 'brain only'.



Children are then taught to solve 2-digit x 2-digit using the a gird as an abridged method. Children are not expected to be able to solve 2-digit x 2-digit problems brain only although some may wish to have to go.

38 x 69 =

x	60	9
30	1800	270
8	480	72

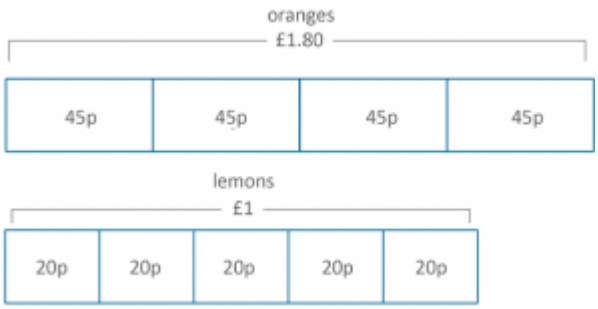
Column methods

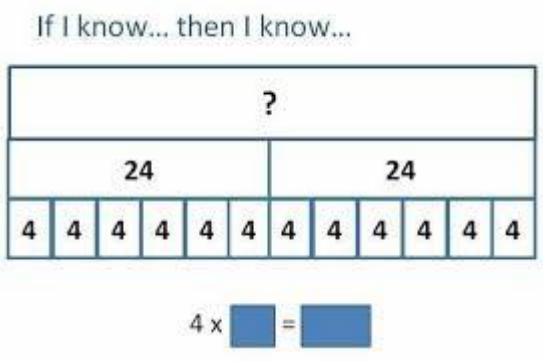
In year 5, children learn how to multiply any 2- and 3-digit numbers by a 2-digit number using a column method. This builds on year 4 knowledge of solving 2-digit x 1-digit problems. The grid method should be taught **before** column methods.

$$\begin{array}{r} {\scriptstyle 3} \\ 85 \\ \times\ 16 \\ \hline 510 \\ 850 \\ \hline 1360 \end{array} \qquad \begin{array}{r} {\scriptstyle 5\ 3} \\ 485 \\ \times\ 16 \\ \hline 2910 \\ 4850 \\ \hline 7760 \\ {\scriptstyle 1} \end{array}$$

Children are also taught to multiply *any* 4-digit number by a 1-digit number ready for the next step.

$$\begin{array}{r} {\scriptstyle 3\ 1} \\ 8152 \\ \times\ 6 \\ \hline 48912 \end{array}$$



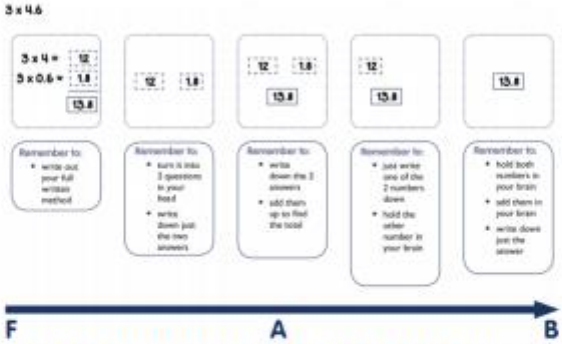


Year 6

Big Maths Multiplication steps	Big Maths Column Method steps
17 – 18	7 – 11

Calculating

In year 6, children are taught to multiply 1-digit numbers by number with 1- and 2- decimal places. They begin by learning the full written method and work through the abridged method to be able to do it 'brain only'.



The final step children are taught is a high-understanding method for solving 2-digit x 3-digit problems. Although inefficient, compared to column methods, it does provide a sound understanding foundation behind column methods of multiplication.

368 x 53 =

x	300	60	8
50			
3			

Column methods

At the beginning of year 6, children are taught to multiply *any* 4-digit number by a 2-digit number using a column method.

$$\begin{array}{r} 3123 \\ \times\ 22 \\ \hline 6246 \\ 62460 \\ \hline 68706 \\ {\scriptstyle 1} \end{array}$$

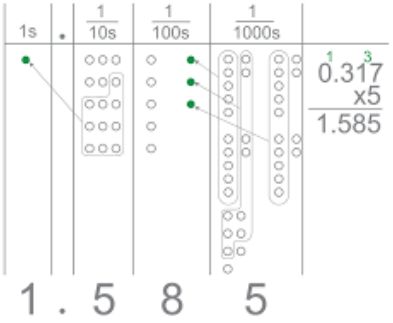
As with subtraction, children are now ready to work in decimal numbers when multiplying. Children are now taught how to solve any 2dp number x 2-digit number. They work through 3 steps before being able to do this.

1.
$$\begin{array}{r} {\scriptstyle 2} \\ 5.6 \\ \times\ 4 \\ \hline 22.4 \end{array}$$

2.
$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 5.24 \\ \times\ 6 \\ \hline 31.44 \end{array}$$

3.
$$\begin{array}{r} {\scriptstyle 1} \\ 5.2 \\ \times\ 36 \\ \hline 31.2 \\ 156.0 \\ \hline 187.2 \end{array}$$

4.
$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 5.24 \\ \times\ 26 \\ \hline 31.44 \\ 104.80 \\ \hline 136.24 \\ {\scriptstyle 1} \end{array}$$



Place value counters to support children in recognising what happens when you multiply with decimals.

Division

Reception and Year 1

Big Maths Division steps	Big Maths Column Method steps
1 – 11	

Calculating

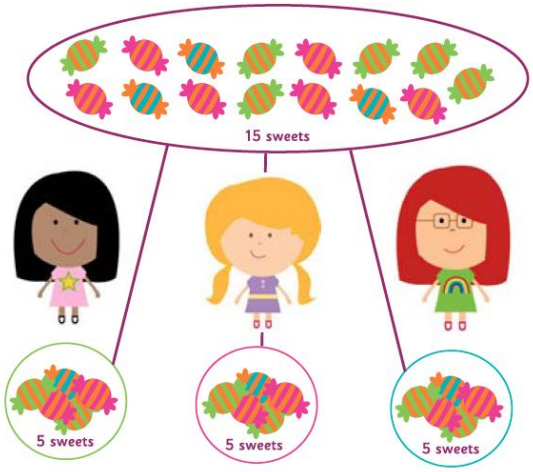
Children are taught to give out objects 'fairly' in the first step of division. This progresses to sharing an even numbers of objects between 2 people, up to 12 objects between 3 people and up to 20 objects between 4 people.



During the Summer term of year 1, children are taught to make groups of 2, 5 and 10 and count through each group to find how many altogether.

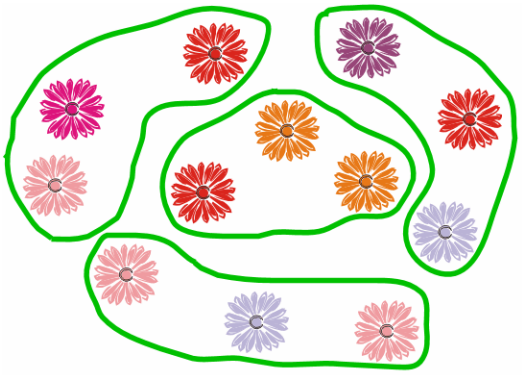
1, 2, 3, 4, 5

6, 7, 8, 9, 10



The idea of sharing is introduced. The language of "one for me, one for my friend" is used.

15 sweet shared between 3 = 5



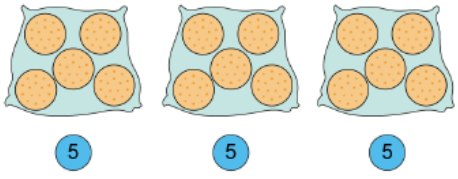
Division by grouping:

12 flowers put into equal groups of 3, 4 groups in total.

15 cookies put into groups of 5. 3 groups in total.

_____ split into ___ groups means there would be _____ in each group.

_____ shared equally between _____ is _____



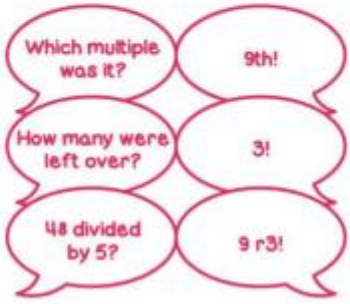
Year 2

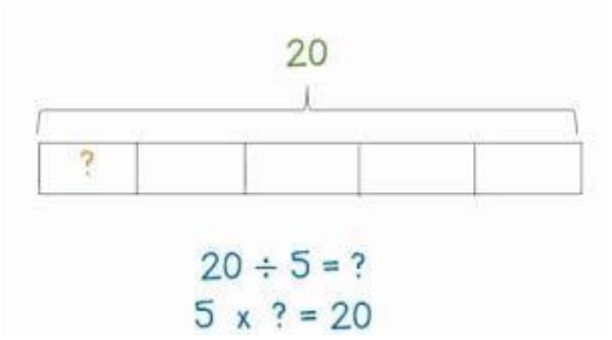
Big Maths Division steps	Big Maths Column Method steps
12 – 17	

Calculating

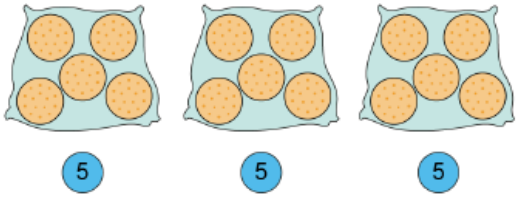
The grouping method is continued into year 2 where children learn to find how many altogether by counting in 2s, 5s or 10s. They are taught to solve division number sentences with objects and then to use times table facts to solve them.

Children are taught to use tables facts to find a division fact, eventually being able to use a brain only method. This links to the 'Where's Mully?' game in the 'It's Nothing New' strand.





Using bar models to demonstrate division is where we start with the whole number and we are trying to find the parts to make that whole.



_____ divided by ___ gives _____ equal groups, with _____ remaining.

Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.

There are 3 whole squares, with 1 left over.

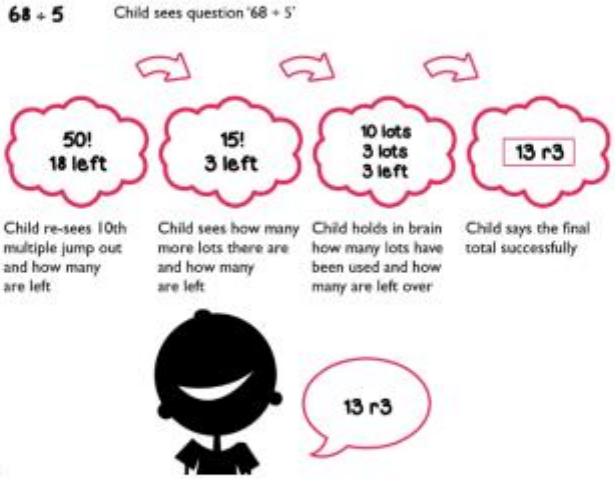
Year 3

Big Maths Division steps	Big Maths Column Method steps
18 – 19	1

Calculating

In year 3, children are taught to combine 2 or more tables facts (2, 3, 4 and 5 only) to solve division without, and later, with remainders. This follows the teaching of 'Where's Mully?' Step 2.

Combining 2 or more times tables encourages the children to think in lots of 10 and seeing how many more they need.

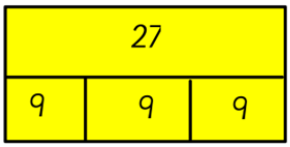


Column methods

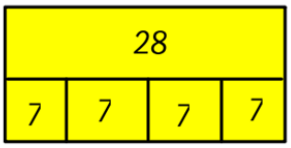
After being taught Step 19 of calculation, children are taught to solve 2-digit ÷ 1-digit problems with no remainders. Children will already know the relevant tables fact for this too so the only 'new' skill is dividing along the columns.

$$3 \overline{)\,69}$$
$$23$$

1.

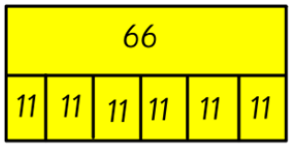


2.

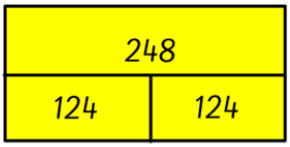


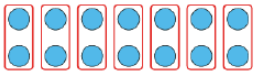
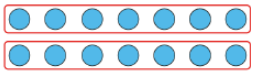
Bar models to represent the equal parts that made up the whole.

3.



4.



Quotitive division	Partitive division
I need 14 ping-pong balls. There are 2 ping-pong balls in a pack. How many packs do I need?	£14 is shared between 2 children. How much money does each child get?
	
14 ÷ 2 = 7	14 ÷ 2 = 7

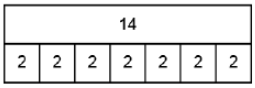
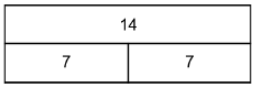

	

Figure 88: using an array and bar model to show that 14 divided into groups of 2 is equal to 7	Figure 89: using an array and bar model to show that 14 shared between 2 is equal to 7

Year 4

Big Maths Division steps	Big Maths Column Method steps
20 – 23	2 – 5

Calculating

In year 4, children are taught to use 6, 7, 8 and 9 times tables facts to find division facts without and then with remainders. They are then taught to combine 2 or more of the same tables facts to solve division problems without and with remainders.

This draws on knowledge from year 3 requiring them to think in lots of 10 and seeing how many more they need.

At this point, children are not expected to be able to do this brain only, just to be able to decide if they can solve any question without needing to rely on a written method.

Column methods

Children are now taught to solve 2-digit + 1-digit problems where there are no remainders in the answer but there are inside the questions.

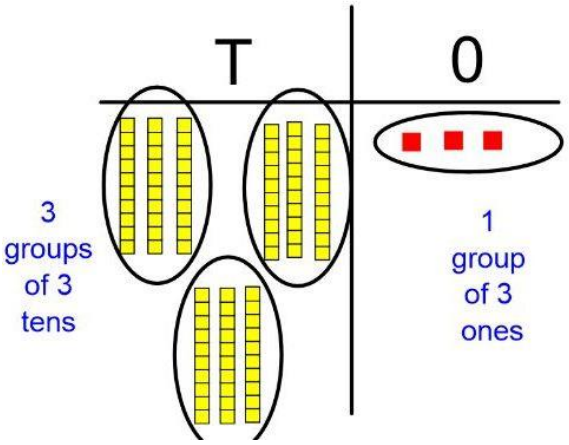
$$3 \overline{)\,8^{2}1} \quad = \quad 27$$

Then, this is applied to solving 3-digit + 1-digit problems and, later on, 4-digit + 1-digit problems (all with no remainders in the answer).

$$9 \overline{)\,{}^{3}3{}^{5}654} \quad = \quad 406$$

Answer

$96 \div 3 = ?$



___ is __ tens and ___ ones. _____ tens divided by _____ is _____. _____ ones divided by _____ is _____. _____ add _____ is _____.

E
re

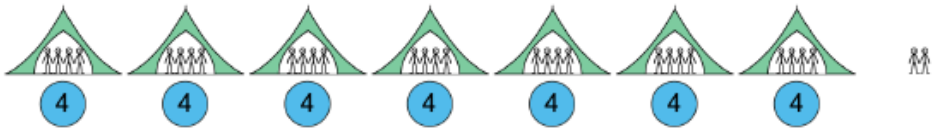


Figure 114: pictorial representation and counters: with 30 scouts and 4 per tent, 7 tents are insufficient

$30 \div 4 = 7 \text{ r } 2$

Year 5

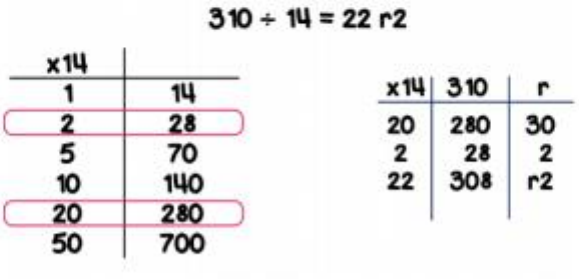
Big Maths Division steps	Big Maths Column Method steps
24 – 31	6 – 7

Calculating

In year 5, children are taught to solve division problems using 'Smile Multiplication' facts and 'Coin Multiplication' facts. Children are required to overlap prior learning to make new learning. They will need to be able to recall 'Learn Its' table facts 2 – 9; have a thorough understanding of 'Smile Multiplication' and; a thorough understanding of fact families.

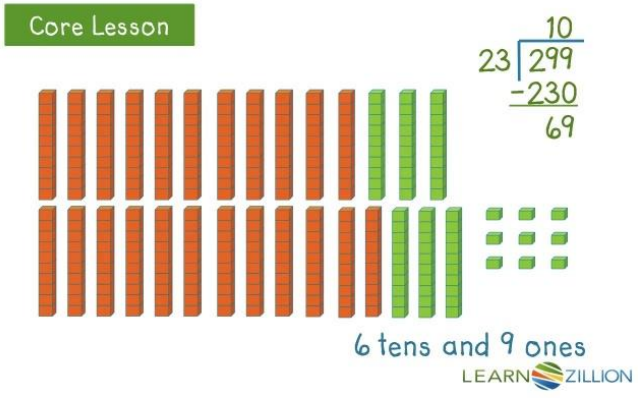
This progresses to combining a 'Smile Multiplication' fact with a tables fact to solve division problems without and then with remainders.

Children are also taught to combine 2 or more coin facts (found in the 'Its Nothing New' strand) to solve division without and then remainders.



Column methods

Children are taught to solve *any* 2-digit ÷ 1-digit, 3-digit ÷ 1-digit and 4-digit ÷ 1-digit problems with remainders and interpret the context i.e. we have 29 people sleeping in 6 birth tents and whilst the division answer is 4 (i.e. 4 tents) the other 5 people still need a tent, and so 6 tents would be needed altogether.



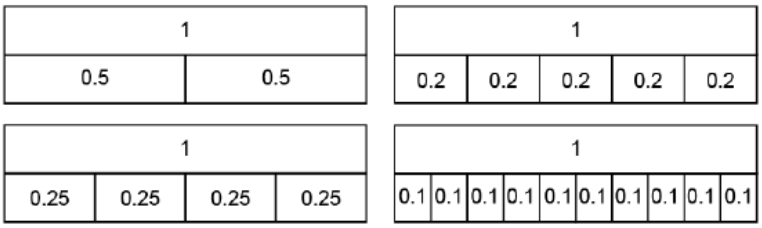


Figure 169: bar models showing 1 partitioned into 2, 4, 5 and 10 equal parts

Year 6

Big Maths Division steps	Big Maths Column Method steps
32 – 33	8 – 10

Calculating

Children in year 6 are taught to use tables facts to find decimal division facts. Children start by using the full written method and move on to solving brain only.

Multiple Choice!

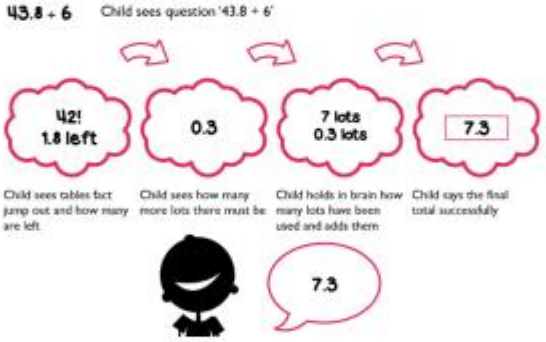
Which one must it be?

Why can't it be the other two?

$2.4 \div 8 = ?$

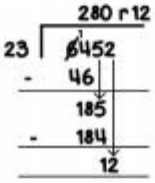
a) 3
b) 0.3
c) 30

Then, children are taught to combine 2 or more table facts to solve decimal division. Again, this starts with a full written method and progresses to brain only.



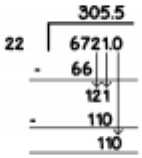
Column methods

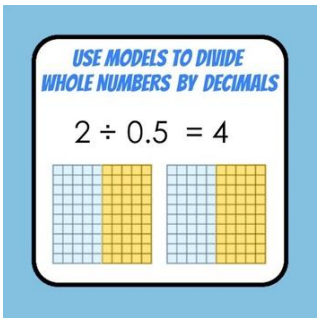
At the beginning of year 6, children are taught to solve any 3-digit ÷ 2-digit problem using a column method. Step 5 of 'Where's Mully?' underpins this column method, as does knowledge of coin multiplication. This progresses to being able to solve 4-digit ÷ 2-digit problems and showing remainders as fractions.



$\frac{12}{23}$

The last step of the division strand teaches the children to solve division with decimal places in the answer.





1,000,000			
250,000	250,000	250,000	250,000

1,000			
250	250	250	250

1			
0.25	0.25	0.25	0.25

Figure 215: bar models showing 1 million, 1,000 and 1 partitioned into 4 equal parts

Policy, Review and Monitoring

The class teachers, the mathematics co-ordinator and the Head teacher will monitor the approaches detailed in this policy.

The policy has been drawn up as a result of staff discussion and has the full agreement of the Governing Body. The implementation of this policy is the responsibility of all the teaching staff.