



The Royal School, Wolverhampton

Calculation Policy



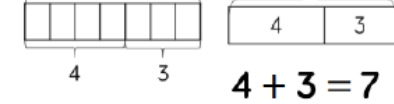
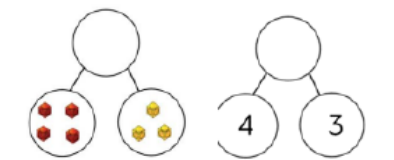
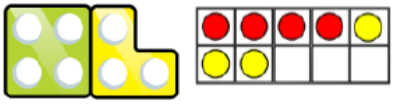
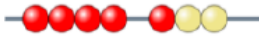



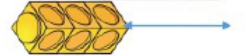
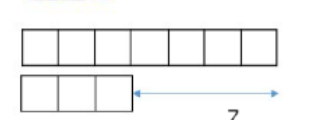
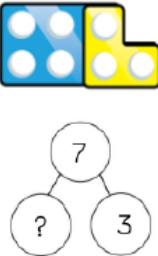
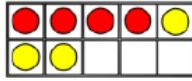
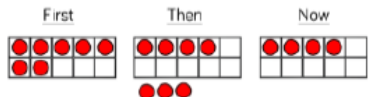








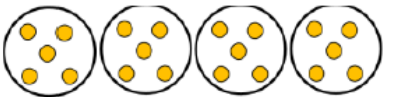
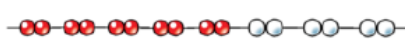



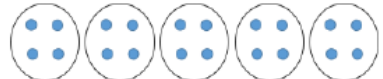


This guidance has been developed from the White Rose Maths Calculation Policy. It is a working document, which will be revised and amended as necessary to reflect our ever-evolving practice. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum.

At The Royal School, we believe that every child has the potential to succeed in Mathematics. Through the three-phase planning approach, children not only develop the mathematics skills and understanding required for later life but also an enthusiasm for and fascination about mathematics itself. We intend to increase pupil confidence in mathematics so that they are able to express themselves and their ideas using the language of mathematics with assurance.

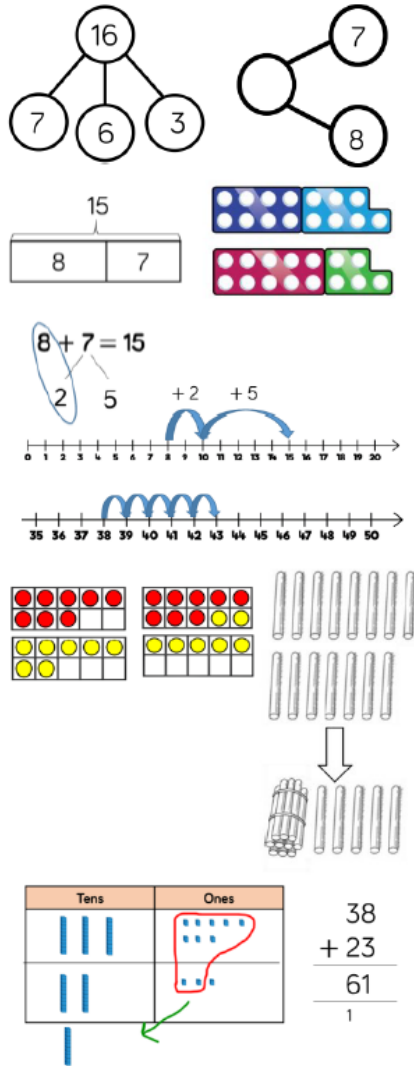
The following calculation policy has been devised to ensure consistency in teaching mathematical concepts throughout the primary phase and is underpinned by the CPA approach: concrete, pictorial, abstract. Each year group is broken down into the four operations (addition, subtraction, multiplication and division). Within each operation are examples of models and images that can be used to promote teaching for mastery.

Children are encouraged to find an appropriate method, which they can use accurately and with confidence. Over time, they will build a bank of mental and written strategies, which they will evaluate to calculate effectively. Although these methods will be modelled by staff, children should experience calculations in alternative forms and presentations to support their understanding of maths in other areas of the curriculum and the wider world.

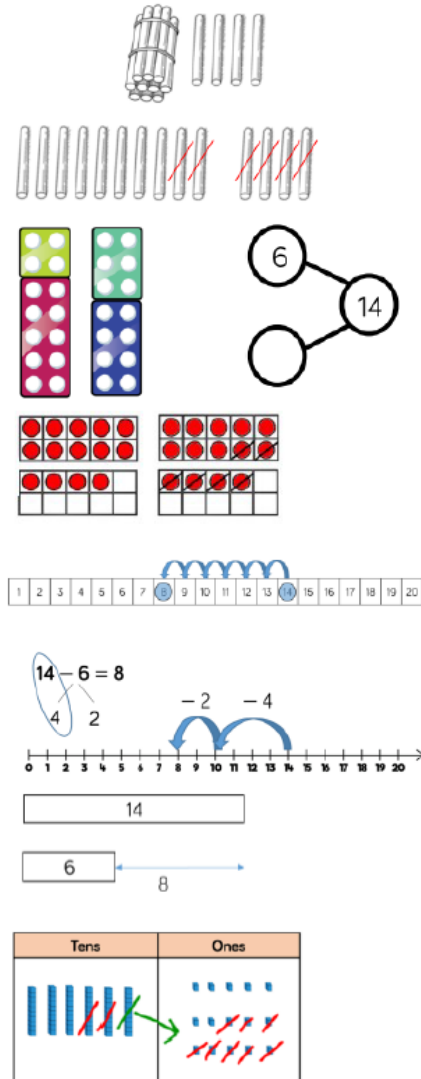
Our aim is for Royal mathematicians to independently apply all four strands of maths: practical investigation, written calculation, reasoning and problem solving and cross-curricular application.

Addition	Subtraction	Multiplication	Division
        <p><u>Vocabulary:</u> Add Total Altogether More</p>	        <p><u>Vocabulary:</u> Subtract Take away Difference between Less</p>	        <p><u>Vocabulary:</u> Lots of Array Repeated addition</p>	   <p>There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?</p>    <p><u>Vocabulary:</u> Share Group Equal groups Array</p>

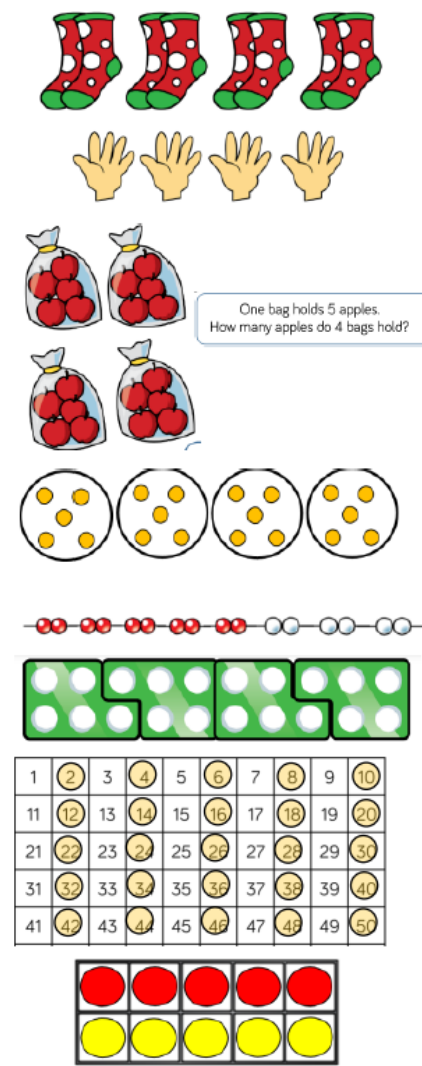
Addition



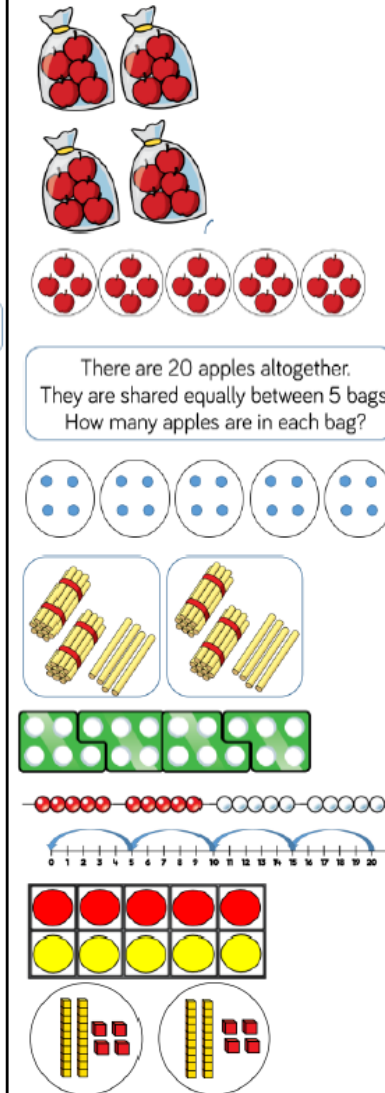
Subtraction



Multiplication



Division



Addition

$$\begin{array}{r} 8 + 7 = 15 \\ \text{2} \quad 5 \end{array}$$

	3	4
+	1	2
	4	6

Tens	Ones

$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ 1 \end{array}$$

Vocabulary:

Add	Commutative
Total	Partitioning
Altogether	Complement
More	
Sum	

Subtraction

$$\begin{array}{r} 14 - 6 = 8 \\ \text{4} \quad 2 \end{array}$$

	5	5
-	3	2
	2	3

Tens	Ones

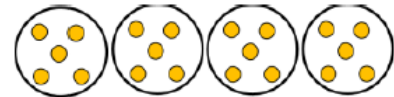
$$\begin{array}{r} 51 \\ - 28 \\ \hline 37 \end{array}$$

Vocabulary:

Subtract
Take away
Difference between
Less
Reduction

Multiplication

One bag holds 5 apples.
How many apples do 4 bags hold?



$$\begin{array}{l} 5 + 5 + 5 + 5 = 20 \\ 4 \times 5 = 20 \\ 5 \times 4 = 20 \end{array}$$

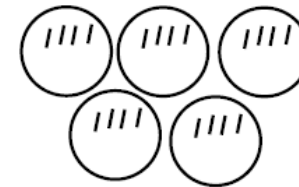
Vocabulary:

Lots of	Array
Times	Multiply
Odd/ Even	Product
Group	Repeated addition
Commutative	

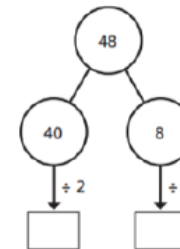
Division

There are 20 apples altogether.
They are shared equally between 5 bags.
How many apples are in each bag?

$$20 \div 5 = 4$$



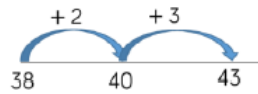
$$48 \div 2 = 24$$



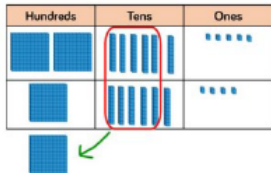
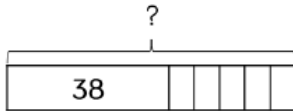
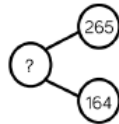
Vocabulary:

Share	Array
Group	Divide
Equal groups	Divisor
	Repeated subtraction

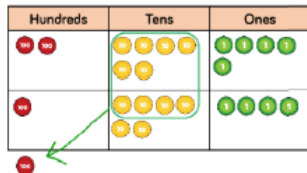
Addition



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
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

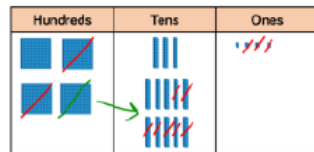
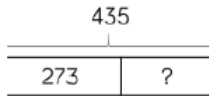
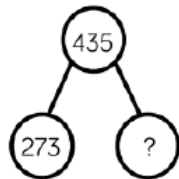
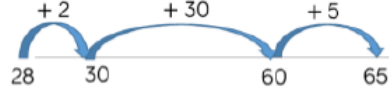


$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$



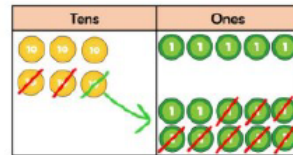
$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$

Subtraction

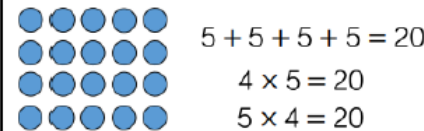
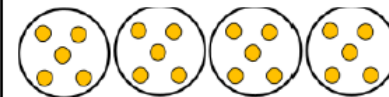
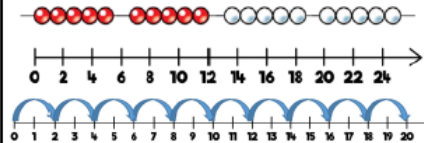


$$\begin{array}{r} 435 \\ - 273 \\ \hline 162 \end{array}$$

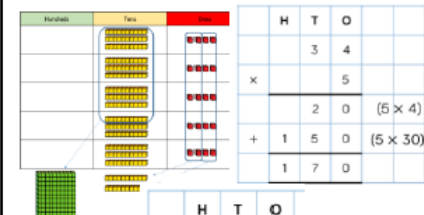
$$\begin{array}{r} 65 \\ - 28 \\ \hline 37 \end{array}$$



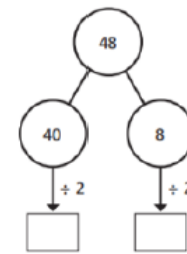
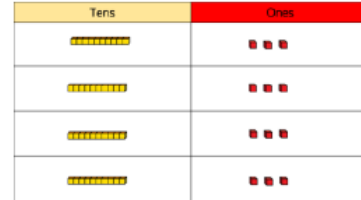
Multiplication



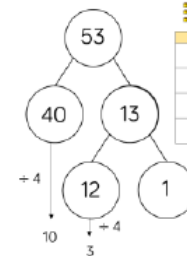
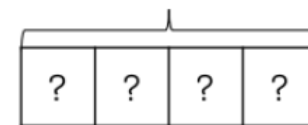
$$\begin{array}{l} 5 + 5 + 5 + 5 = 20 \\ 4 \times 5 = 20 \\ 5 \times 4 = 20 \end{array}$$



Division

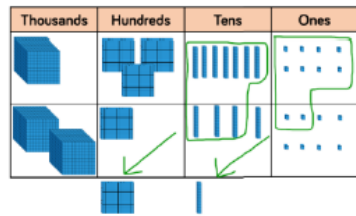
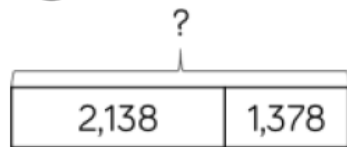
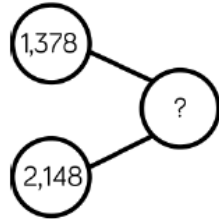


52

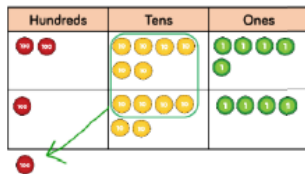


Year 3: written methods & vocabulary																																																	
Addition	Subtraction	Multiplication	Division																																														
<div><div>805 +102 ----- 907</div><div>38 + 23 ----- 61 1</div><div>265 + 164 ----- 429 1</div></div> <div><div>Vocabulary:</div><div><div>Add</div><div>Total</div><div>Altogether</div><div>More</div><div>Sum</div><div>Commutative</div><div>Partitioning</div><div>Complement</div><div>Exchange</div></div></div>	<div><div>8 7 4 - 5 2 3 ----- 3 5 1</div><div>5 1 65 - 28 ----- 37</div><div>3 1 435 - 273 ----- 262</div></div> <div><div>Vocabulary:</div><div><div>Subtract</div><div>Take away</div><div>Difference between</div><div>Less</div><div>Exchange</div><div>Reduction</div></div></div>	<div><div><div><div><div>●●●●●</div><div>●●●●●</div><div>●●●●●</div><div>●●●●●</div></div><div>5 + 5 + 5 + 5 = 20</div></div><div><div><div>●●●●●</div><div>●●●●●</div></div><div>4 × 5 = 20</div></div><div><div><div>●●●●●</div><div>●●●●●</div></div><div>5 × 4 = 20</div></div></div><div><div>34 × 5 = 170</div><div><table><tr><td></td><td>H</td><td>T</td><td>O</td><td></td></tr><tr><td></td><td></td><td>3</td><td>4</td><td></td></tr><tr><td>x</td><td></td><td></td><td>5</td><td></td></tr><tr><td></td><td></td><td>2</td><td>0</td><td>(5 × 4)</td></tr><tr><td>+</td><td>1</td><td>5</td><td>0</td><td>(5 × 30)</td></tr><tr><td></td><td>1</td><td>7</td><td>0</td><td></td></tr></table></div><div><table><tr><td></td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td></td><td>3</td><td>4</td></tr><tr><td>x</td><td></td><td></td><td>5</td></tr><tr><td></td><td>1</td><td>7</td><td>0</td></tr></table><div>1 2</div></div></div></div> <div><div>Vocabulary:</div><div><div>Lots of</div><div>Times</div><div>Odd/ Even</div><div>Group</div><div>Repeated addition</div><div>Commutative</div><div>Array</div><div>Multiply</div><div>Product</div><div>Exchange</div><div>Factors</div><div>Multiples</div></div></div>		H	T	O				3	4		x			5				2	0	(5 × 4)	+	1	5	0	(5 × 30)		1	7	0			H	T	O			3	4	x			5		1	7	0	<div><div>52 ÷ 4 = 13</div><div><div><div>48</div><div>40</div><div>8</div><div>÷ 2</div><div>÷ 2</div><div></div><div></div></div><div><div>53</div><div>40</div><div>13</div><div>÷ 4</div><div>÷ 4</div><div>10</div><div>3</div><div>1</div></div></div></div> <div><div>Vocabulary:</div><div><div>Share</div><div>Group</div><div>Equal groups</div><div>Partition</div><div>Remainder</div><div>Array</div><div>Divide</div><div>Divisor</div><div>Quotient</div><div>Exchange</div><div>Repeated subtraction</div></div></div>
	H	T	O																																														
		3	4																																														
x			5																																														
		2	0	(5 × 4)																																													
+	1	5	0	(5 × 30)																																													
	1	7	0																																														
	H	T	O																																														
		3	4																																														
x			5																																														
	1	7	0																																														

Addition

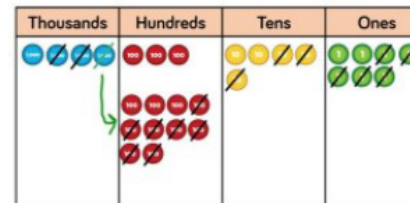
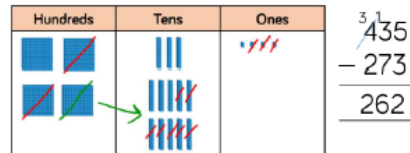
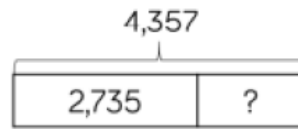
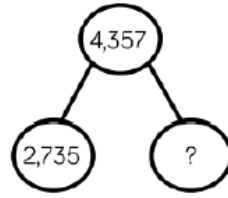


$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$



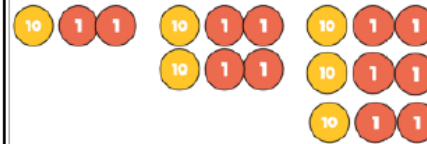
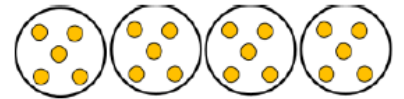
$$\begin{array}{r} 1378 \\ + 2148 \\ \hline 3526 \\ 11 \end{array}$$

Subtraction

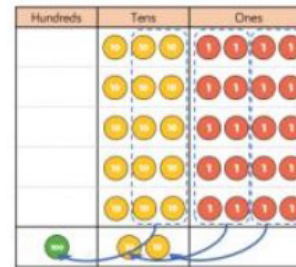


$$\begin{array}{r} 435 \\ - 273 \\ \hline 262 \end{array}$$

Multiplication



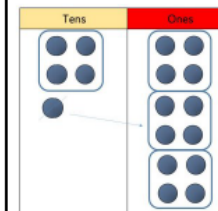
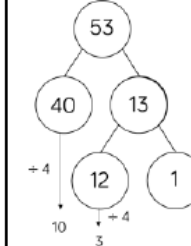
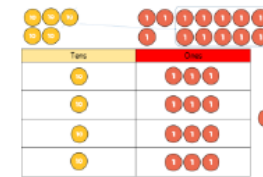
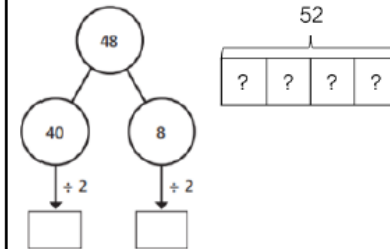
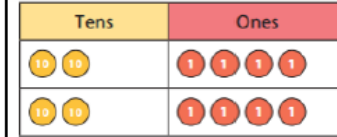
$$\begin{array}{l} 5 + 5 + 5 + 5 = 20 \\ 4 \times 5 = 20 \\ 5 \times 4 = 20 \end{array}$$



$$\begin{array}{r} \text{H T O} \\ 3 \quad 4 \\ \times \quad 5 \\ \hline 20 \quad (5 \times 4) \\ + 150 \quad (5 \times 30) \\ \hline 170 \end{array}$$

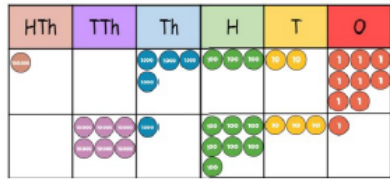
$$\begin{array}{r} \text{H T O} \\ 3 \quad 4 \\ \times \quad 5 \\ \hline 170 \end{array}$$

Division

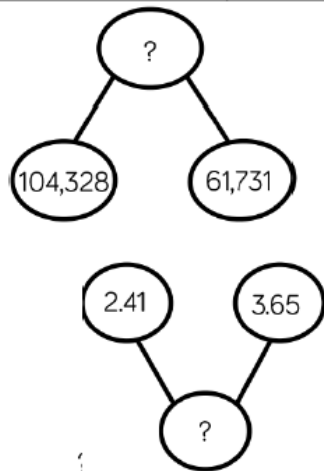


$$\begin{array}{r} 13 \\ 4 \overline{) 53} \\ \underline{4} \quad 13 \\ \underline{12} \quad 1 \end{array}$$

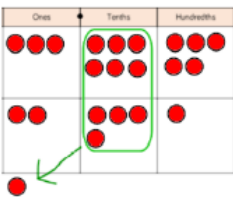
Addition



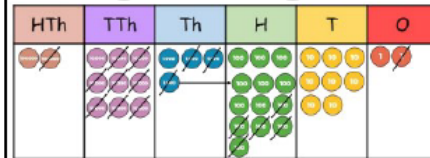
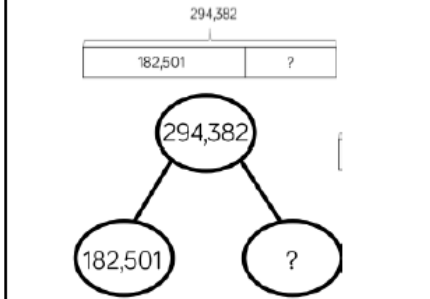
104,328	61,731
---------	--------



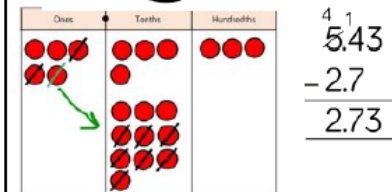
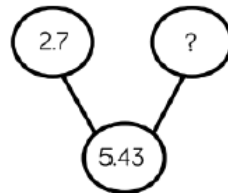
3.65	2.41
------	------



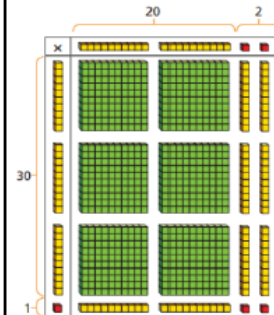
Subtraction



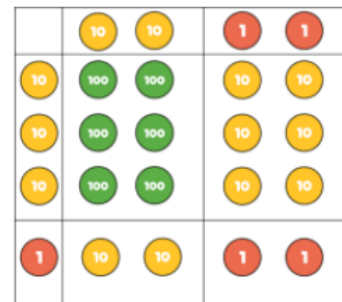
	2	9	3	1	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1



Multiplication



x	20	2
30	600	60
1	20	2



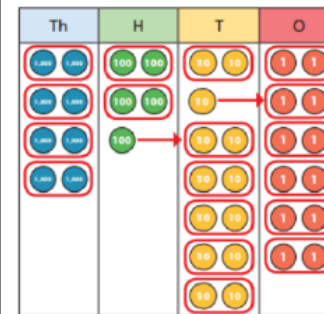
	H	T	O
		2	2
x		3	1
		2	2
	6	6	0
	6	8	2

TTh	Th	H	T	O
		2	7	3
x			2	8
2	1	9	1	2
2	5	3	7	
5	4	7	8	0
1	7	6	6	9
				2

Division



		2	1	4
	4	8	5	16



		0	4	8	9
15	7	7.3	13.5	15.0	

75	50	45	60	75	90	105	120	135	150
----	----	----	----	----	----	-----	-----	-----	-----

$$7,335 \div 15 = 489$$

Year 5: written methods & vocabulary

Addition

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ 11 \end{array}$$

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

1

$$\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ 1 \end{array}$$

Vocabulary:

Add	Commutative
Total	Partitioning
Altogether	Complement
More	Exchange
Sum	Addend

Subtraction

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$$

$$\begin{array}{r} 4 \quad 1 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$$

Vocabulary:

Subtract	Exchange
Take away	Reduction
Difference between	Minuend
Less	Subtrahend

Multiplication

×	20	2
30	600	60
1	20	2

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2	1	9	1	2
2	5	3	7	
5	4	7	8	0
1		1		
7	6	6	9	2

Vocabulary:

Lots of	Array
Times	Multiply
Odd/ Even	Product
Group	Multiplicand
Repeated addition	Multiplier
Commutative	Factors
Exchange	Multiples

Division

		2	1	4
	4	8	5	16

	4	2	6	6
2	8	5	13	12

Vocabulary:

Share	Array
Group	Divide
Equal groups	Divisor
Partition	Quotient
Remainder	Dividend
Exchange	Factors
	Multiples

Year 6: written methods & vocabulary

Addition

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ 11 \end{array}$$

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

1

$$\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ 1 \end{array}$$

Vocabulary:

Add	Commutative
Total	Partitioning
Altogether	Complement
More	Exchange
Sum	Addend

Subtraction

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

$$\begin{array}{r} 8121 \\ - 457 \\ \hline 475 \end{array}$$

$$\begin{array}{r} 41 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$$

Vocabulary:

Subtract	Exchange
Take away	Reduction
Difference between	Minuend
Less	Subtrahend

Multiplication

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}$$

$$\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$$

TTh	Th	H	T	O
	2	7	3	9
x			2	8
2	1	9	1	2
2	5	3	7	
5	4	7	8	0
1				
7	6	6	9	2

1

Vocabulary:

Lots of	Array
Times	Multiply
Odd/ Even	Product
Group	Multiplicand
Repeated addition	Multiplier
Commutative	Factors
Exchange	Multiples

Division

$$\begin{array}{r} 86r2 \\ 5 \overline{) 432} \end{array}$$

When dividing by 2 digit number, show children long division method below and short division method.

	0	4	8	9
15	7	7	13	13

Multiples encouraged

		2	4	r	1	2
1	5	3	7	2		
-		3	0	0		
		7	2			
-		6	0			
		1	2			

Multiples

+ 1 x 15 = 15
x 2 x 15 = 30
- 3 x 15 = 45
4 x 15 = 60
5 x 15 = 75
10 x 15 = 150

$$\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$$

Show remainder as remainder, fraction and then decimal

Vocabulary:

Share	Array
Group	Divide
Equal groups	Divisor
Partition	Quotient
Remainder	Dividend
Exchange	Factors
	Multiples