



Calculation Policy

About our calculation policy

The following calculation policy has been devised to meet requirements of the National Curriculum for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school.

This calculation policy is focused on developing proficiency with the expected formal written methods by the end of year 6 and hence the progression guidance provided for each operation is designed to flow into the expected method as exemplified on the National Curriculum Appendix document, White Rose Maths and NCETM.

Age-related expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum, however it is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on. It is expected that academies will work towards the fluency goals for each age group but that, where necessary, teachers will use approaches and materials from earlier year groups to bridge any gaps in a child's understanding.

Teachers should have an understanding of the expectations and progression for all year groups, regardless of which year group they teach.

Concrete, Pictorial and Abstract Approach

Providing a context for calculation

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Teaching calculations using concrete materials

In order for children to develop a deep conceptual understanding of mathematics, we believe that teaching of calculations ought to be supported by the use of concrete materials. Children should be taught, and encouraged to use, manipulatives, pictorial representations and symbolic representations cyclically throughout all key stages. Specific practical equipment and approaches have been suggested for each age group to support children in developing the conceptual understanding that will enable them to move more rapidly and efficiently towards the formal written methods expected. It is recommended that teachers encourage children to simultaneously carry out the calculation practically using the equipment/representation suggested and to record this calculation step by step using the parallel formal written method.

Table of Contents

+ Addition

- Subtraction

× Multiplication

÷ Division

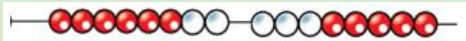
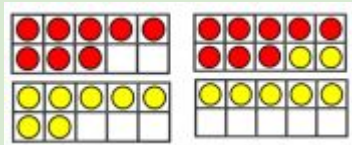
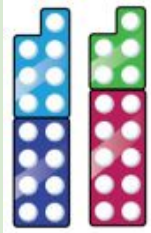
Addition

Year 1

Objective: to add 1 and 2-digit numbers to 20

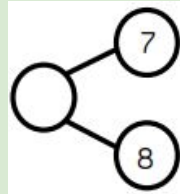
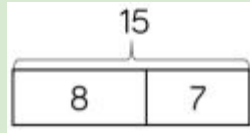
Concrete

Numicon, tens frames and bead strings.



Pictorial

Bar models, part-whole models and number lines.



Abstract

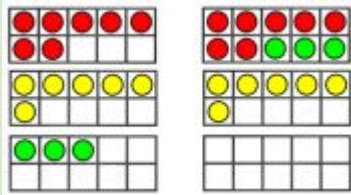
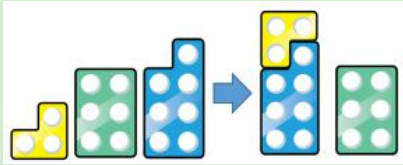
$$8 + 7 = 15$$

Year 2

Objective: to add three 1-digit numbers

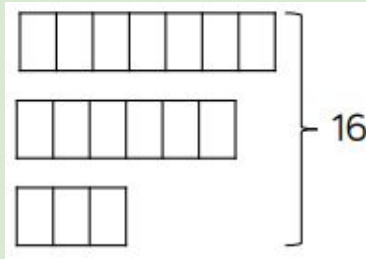
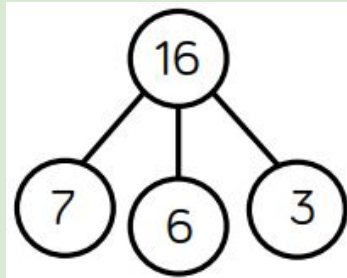
Concrete

Numicon and tens frames.



Pictorial

Bar models and part-whole models.



Abstract

$$7 + 6 + 3 = 16$$

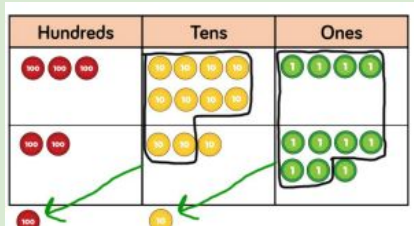
$$7 + 6 + 3 = 16$$

Year 2/3

Objective: to add 1-digit and 2-digit numbers to 100

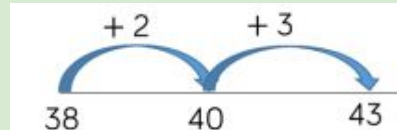
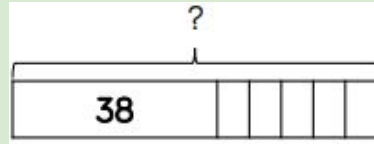
Concrete

Place value counters

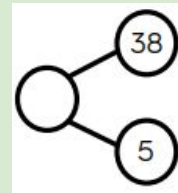


Pictorial

Bar models, number lines, hundred squares and part-whole models.



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



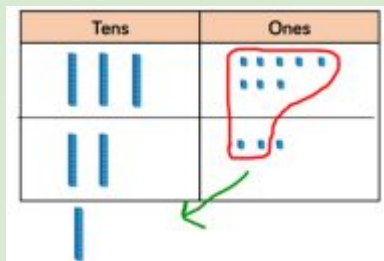
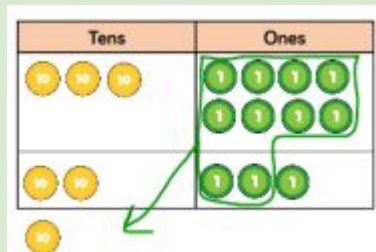
Abstract

$$38 + 5 = 43$$

Objective: to add 2-digit numbers to 100

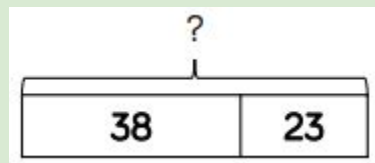
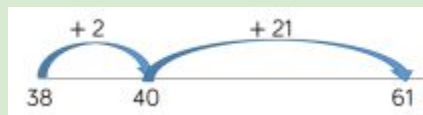
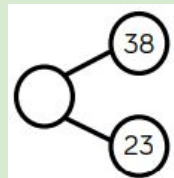
Concrete

Place value counters and base ten.



Pictorial

Bar models, number lines and part-whole models.



Abstract

$$38 + 23 = 61$$

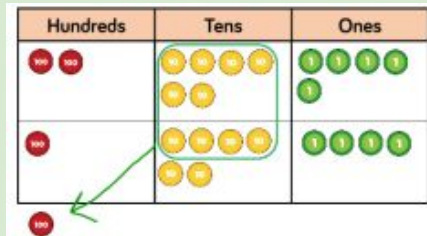
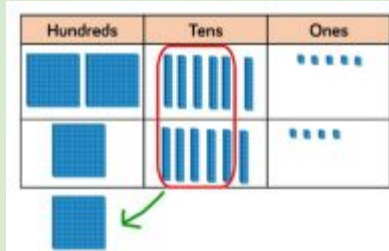
$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \hline 1 \end{array}$$

Year 3

Objective: to add numbers with up to 3 digits

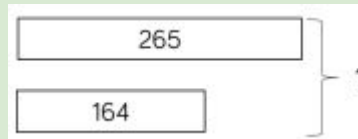
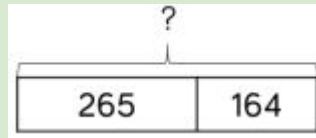
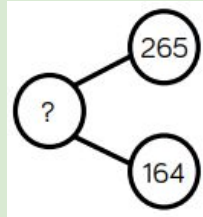
Concrete

Place value counters and base ten.



Pictorial

Bar models and part-whole models.



Abstract

$$265 + 164 = 429$$

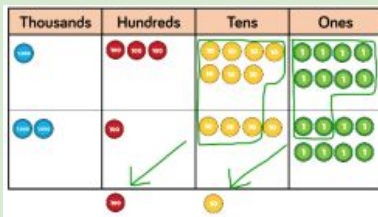
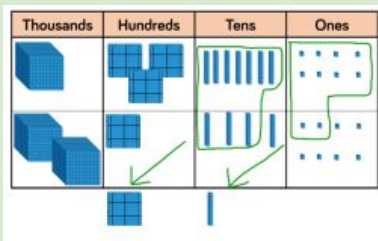
$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$

Year 4

Objective: to add numbers with up to 4 digits

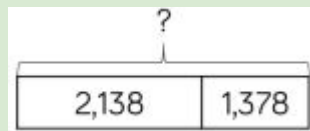
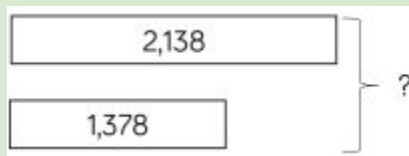
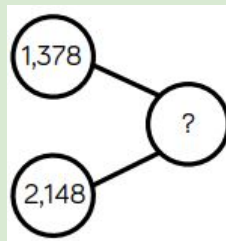
Concrete

Place value counters and base ten.



Pictorial

Bar models and part-whole models.



Abstract

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

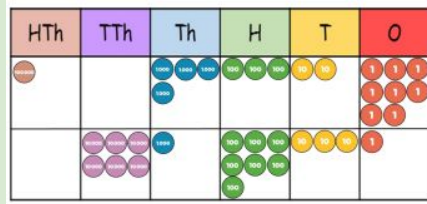
$$1,378 + 2,148 = 3,526$$

Year 5/6

Objective: to add numbers with more than 4 digits

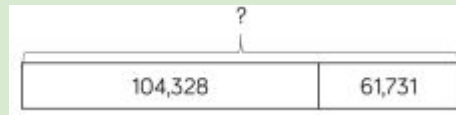
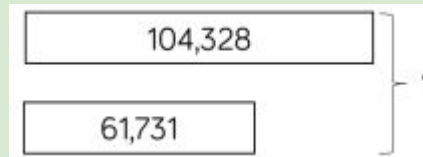
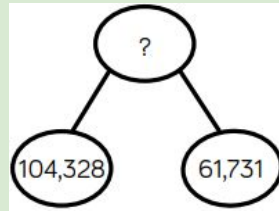
Concrete

Place value counters.



Pictorial

Bar models and part-whole models.



Abstract

$$104,328 + 61,731 = 166,059$$

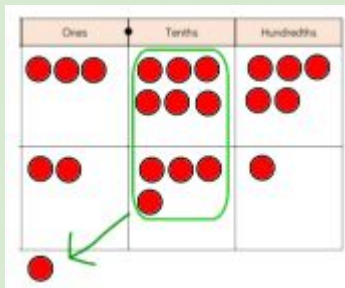
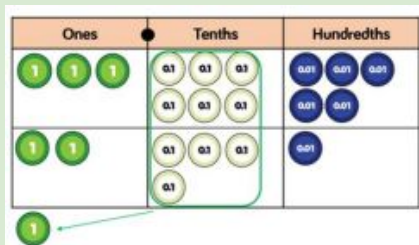
1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
1					

Year 5

Objective: to add numbers with up to 3 decimal places

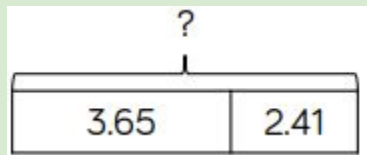
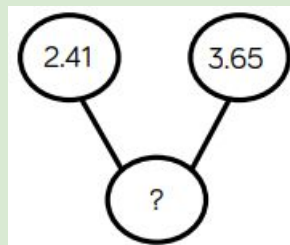
Concrete

Place value counters.



Pictorial

Bar models and part-whole models.



Abstract

$$3.65 + 2.41 = 6.06$$

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

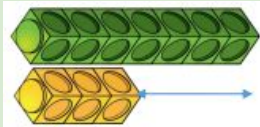
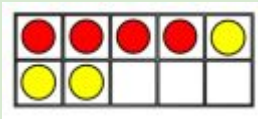
Subtraction

Year 1

Objective: to subtract 1-digit numbers within 10

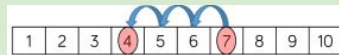
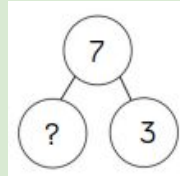
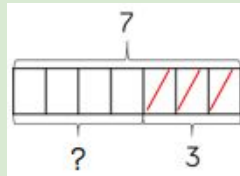
Concrete

Numicon, cubes, tens frames and bead strings.



Pictorial

Bar models, part-whole models and number lines.



Abstract

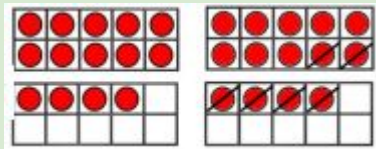
$$7 - 3 = 4$$

Year 1/2

Objective: to subtract 1 and 2-digit numbers to 20

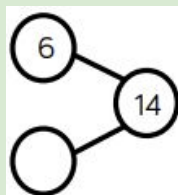
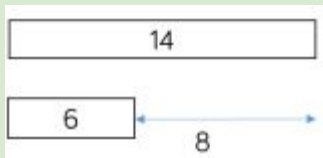
Concrete

Numicon and tens frames .



Pictorial

Bar models, part-whole models and number lines.



Abstract

$$14 - 6 = 8$$

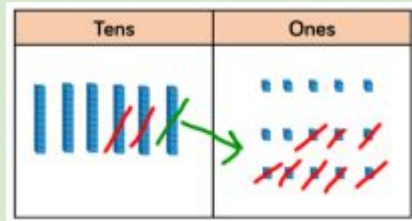
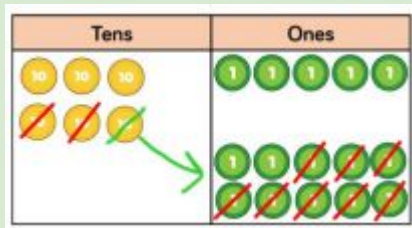
$$14 - 6 = 8$$

Year 2/3

Objective: to subtract 1 and 2-digit numbers to 100

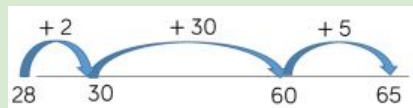
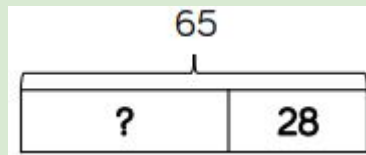
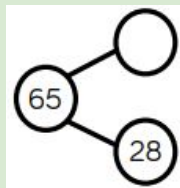
Concrete

Place value counters and base ten.



Pictorial

Bar models, part-whole models and number lines.



Abstract

$$65 - 28 = 37$$

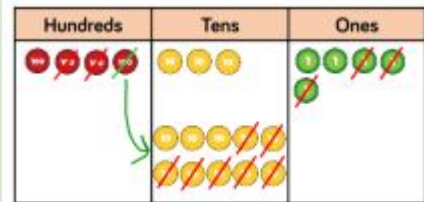
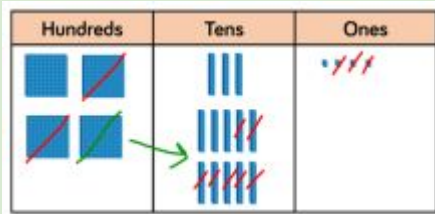
$$\begin{array}{r} 65 \\ - 28 \\ \hline 37 \end{array}$$

Year 3

Objective: to subtract numbers with up to 3 digits

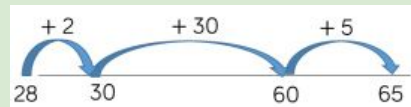
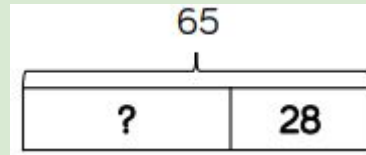
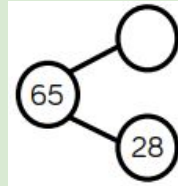
Concrete

Place value counters and base ten.



Pictorial

Bar models, part-whole models and number lines.



Abstract

$$435 - 273 = 162$$

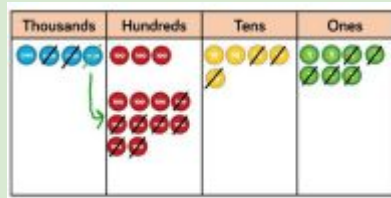
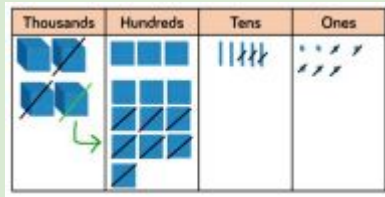
$$\begin{array}{r} ^3^1 435 \\ - 273 \\ \hline 162 \end{array}$$

Year 4

Objective: to subtract numbers with up to 4 digits

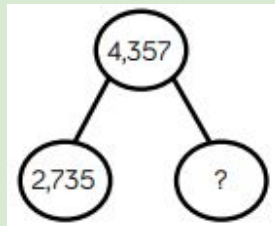
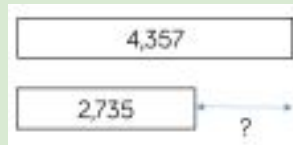
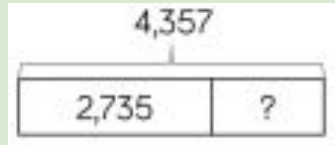
Concrete

Place value counters and base ten.



Pictorial

Bar models and part-whole models.



Abstract

$$4,357 - 2,735 = 1,622$$

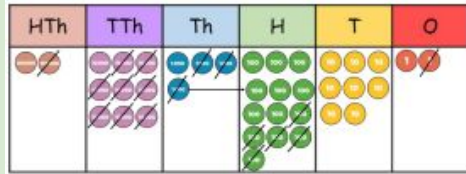
$$\begin{array}{r} 4357 \\ - 2735 \\ \hline 1622 \end{array}$$

Year 5/6

Objective: to subtract numbers with more than 4 digits

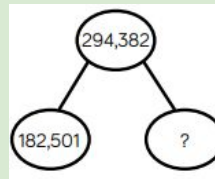
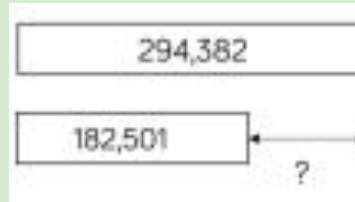
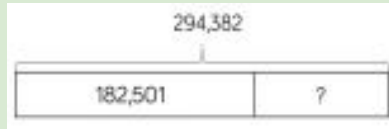
Concrete

Place value counters.



Pictorial

Bar models and part-whole models.



Abstract

$$294,382 - 182,501 = 111,881$$

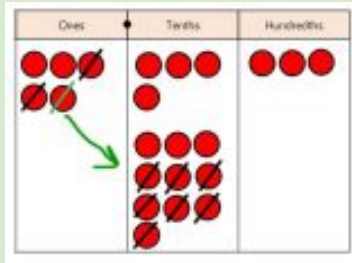
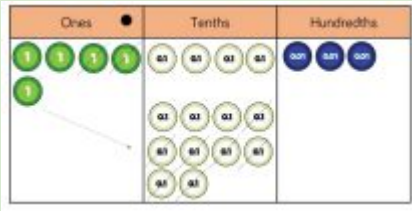
	2	9	3	1 3	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1

Year 5/6

Objective: to subtract numbers with up to 3 decimal places

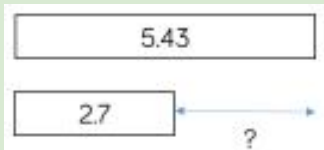
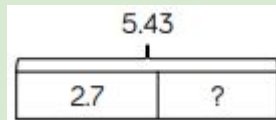
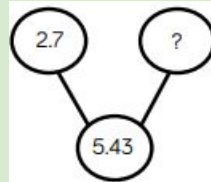
Concrete

Place value counters.



Pictorial

Bar models and part-whole models.



Abstract

$$5.43 - 2.7 = 2.73$$

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

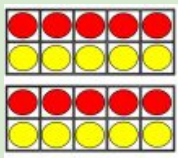
Multiplication

Year 1/2

Objective: to solve 1-step problems using multiplication

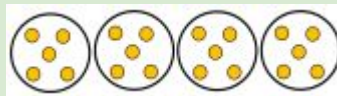
Concrete

Numicon, cubes, tens frames and bead strings.



Pictorial

Arrays and number lines.



Abstract

$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

Year 3/4

Objective: to multiply 2-digit numbers by 1-digit numbers

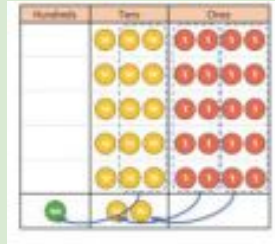
Concrete

Place value counters and base ten.



Pictorial

Place value chart.



Abstract

$$34 \times 5 = 170$$

	H	T	O	
		3	4	
x			5	
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
	1	7	0	

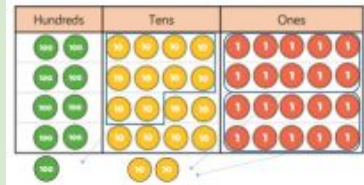
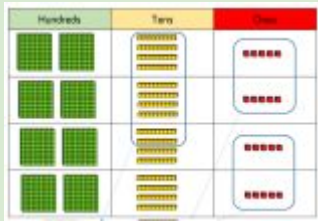
	H	T	O	
		3	4	
x			5	
	1	7	0	
	1	2		

Year 4

Objective: to multiply 3-digit numbers by 1-digit numbers

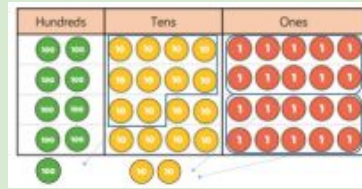
Concrete

Place value counters and base ten.



Pictorial

Place value chart.



Abstract

$$245 \times 4 = 980$$

	H	T	O
	2	4	5
x			4
	9	8	0
	1	2	

Year 5

Objective: to multiply 4-digit numbers by 1-digit numbers

Concrete

Place value counters.



Pictorial

Place value chart.



Abstract

$$1,826 \times 3 = 5,478$$

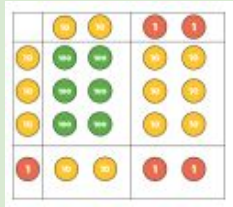
	Th	H	T	O
	1	8	2	6
\times				3
	5	4	7	8
	2	1		

Year 5

Objective: to multiply 2, 3-digit numbers by 2-digit numbers

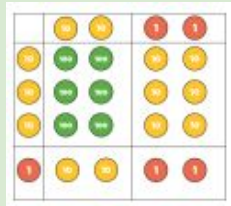
Concrete

Place value counters.



Pictorial

Place value chart.



Abstract

$$22 \times 31 = 682$$

×	20	2
30	600	60
1	20	2

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

$$234 \times 32 = 7,488$$

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
17	10	2	0
7	4	8	8

Year 5/6

Objective: to multiply 2, 3-digit numbers by 2-digit numbers

Abstract

$$2,739 \times 28 = 76,692$$

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		1		
7	6	6	9	2
1				

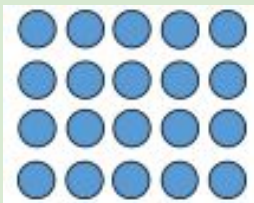
Division

Year 1/2

Objective: to solve 1-step problems using multiplication (sharing)

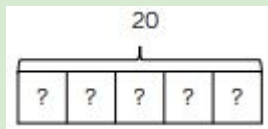
Concrete

Counters.



Pictorial

Bar models, arrays and grouping.



Abstract

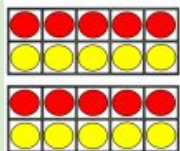
$$20 \div 5 = 4$$

Year 1/2

Objective: to solve 1-step problems using multiplication (grouping)

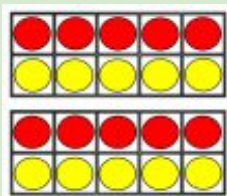
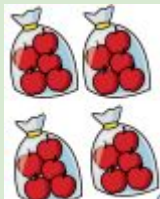
Concrete

Counters, bead strings and tens frames.



Pictorial

Number lines and grouping.



Abstract

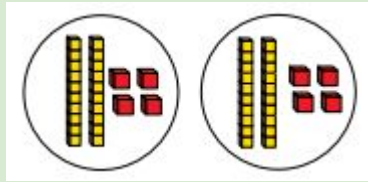
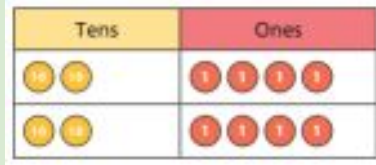
$$20 \div 5 = 4$$

Year 3

Objective: to solve 1-step problems using multiplication (grouping)

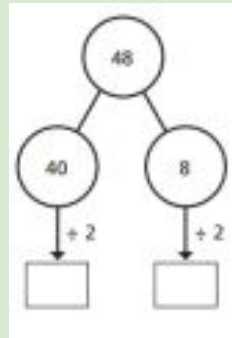
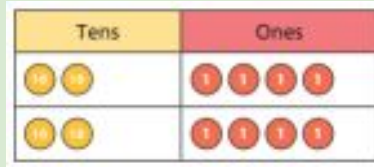
Concrete

Counters and base ten.



Pictorial

Place value chart and part-whole model.



Abstract

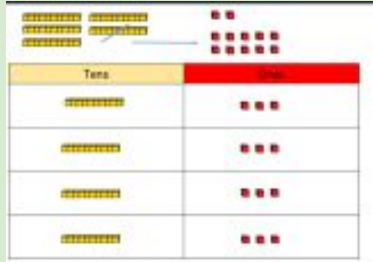
$$48 \div 2 = 24$$

Year 3/4

Objective: to divide 2-digits by 1-digit (sharing with exchange)

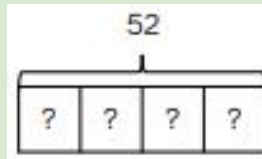
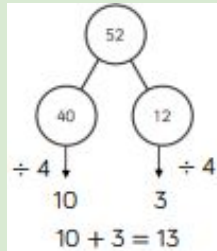
Concrete

Counters and base ten.



Pictorial

Place value chart, bar model and part-whole model.



Abstract

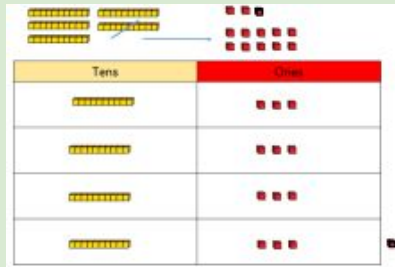
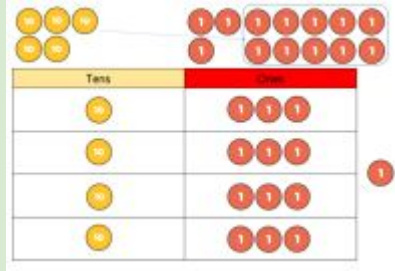
$$52 \div 4 = 13$$

Year 3/4

Objective: to divide 2-digits by 1-digit (sharing with remainders)

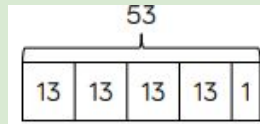
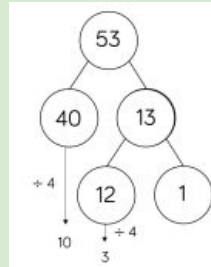
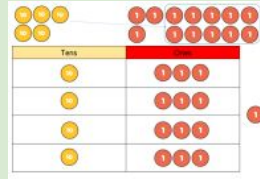
Concrete

Counters and base ten.



Pictorial

Place value chart, bar model and part-whole model.



Abstract

$$53 \div 4 = 13 \text{ r}1$$

Year 4

Objective: to divide 3-digits by 1-digit (sharing)

Concrete

Counters

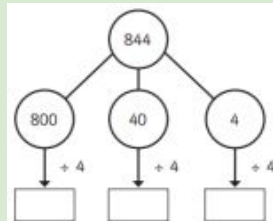
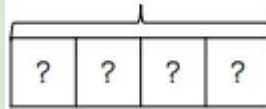


Pictorial

Place value chart, bar model and part-whole model.



844



Abstract

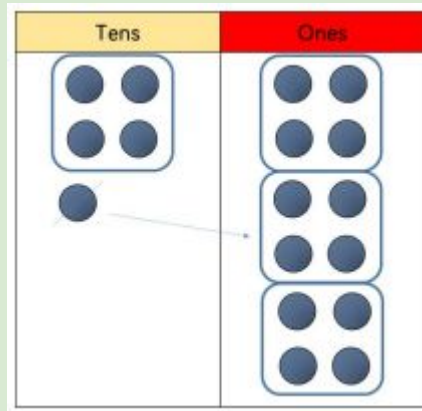
$$844 \div 4 = 211$$

Year 5

Objective: to divide 2-digits by 1-digit (grouping)

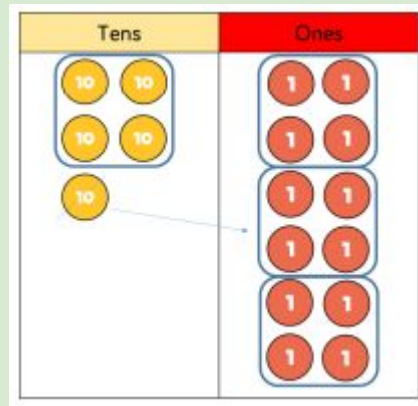
Concrete

Counters



Pictorial

Place value chart



Abstract

$$52 \div 4 = 13$$

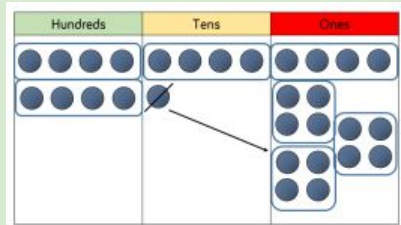
		1	3	
	4	5	12	

Year 5

Objective: to divide 3-digits by 1-digit (grouping)

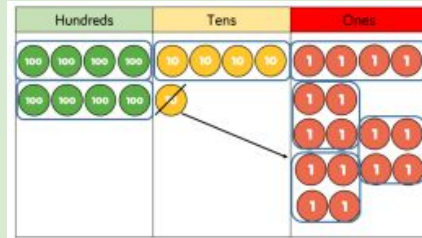
Concrete

Counters



Pictorial

Place value chart



Abstract

$$856 \div 4 = 214$$

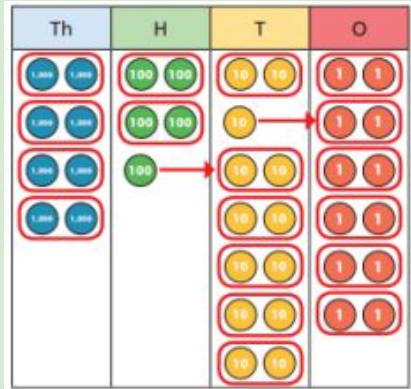
		2	1	4
	4	8	5	¹ 6

Year 5

Objective: to divide 4-digits by 1-digit (grouping)

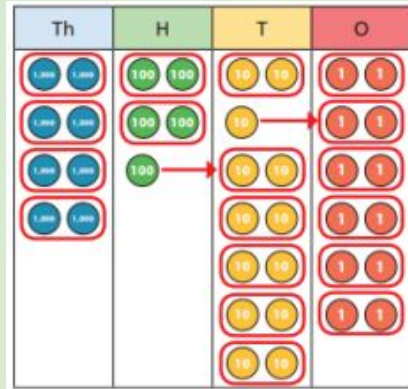
Concrete

Counters



Pictorial

Place value chart



Abstract

$$8,532 \div 2 = 4,266$$

	4	2	6	6
2	8	5	13	12

Year 6

Objective: to divide multi digits by 2-digits (short division)

Abstract

$$432 \div 12 = 36$$

		0	3	6
	12	4	⁴ 3	⁷ 2

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

	0	4	8	9
15	7	⁷ 3	¹³ 3	¹³ 5

15	30	45	60	75	90	105	120	135	150
----	----	----	----	----	----	-----	-----	-----	-----

Year 6

Objective: to divide multi digits by 2-digits (long division)

Abstract

1. Write down the multiples
2. Divide
3. Multiply
4. Subtract
5. Bring the number down
6. Repeat

$$432 \div 12 = 36$$

$$\begin{aligned} 12 \times 1 &= 12 \\ 12 \times 2 &= 24 \\ 12 \times 3 &= 36 \\ 12 \times 4 &= 48 \\ 12 \times 5 &= 60 \\ 12 \times 6 &= 72 \\ 12 \times 7 &= 84 \\ 12 \times 8 &= 96 \\ 12 \times 9 &= 108 \\ 12 \times 10 &= 120 \end{aligned}$$

			0	3	6	
1	2	4	3	2		(x30)
	-	3	6	0		
			7	2		(x6)
	-		7	2		
				0		

Year 6

Objective: to divide multi digits by 2-digits (long division with a remainder)

Abstract

1. Write down the multiples
2. Divide
3. Multiply
4. Subtract
5. Bring the number down
6. Repeat

$$372 \div 15 = 24 \text{ r}12$$

$$\begin{array}{l} 1 \times 15 = 15 \\ 2 \times 15 = 30 \\ 3 \times 15 = 45 \\ 4 \times 15 = 60 \\ 5 \times 15 = 75 \\ 10 \times 15 = 150 \end{array}$$

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

$$372 \div 15 = 24 \frac{4}{5}$$

$$\begin{array}{l} 1 \times 15 = 15 \\ 2 \times 15 = 30 \\ 3 \times 15 = 45 \\ 4 \times 15 = 60 \\ 5 \times 15 = 75 \\ 10 \times 15 = 150 \end{array}$$

			2	4	$\frac{4}{5}$
1	5	3	7	2	
	-	3	0	0	
			7	2	
	-		6	0	
			1	2	