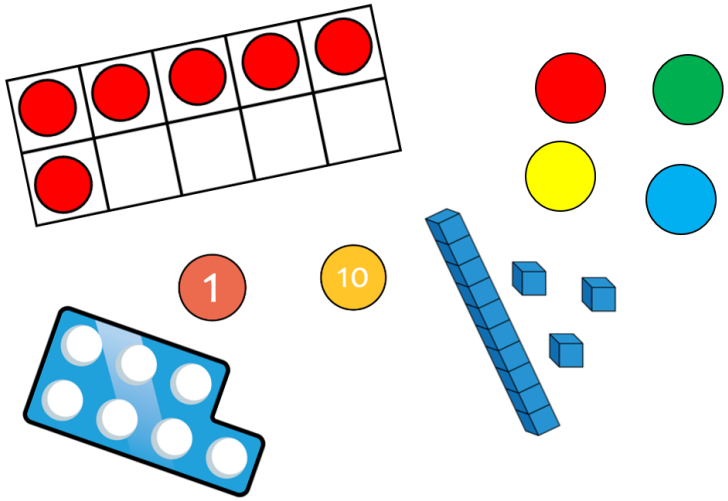
St John Fisher Catholic Voluntary Academy

Calculation Policy

September 2020



Progression in written calculation

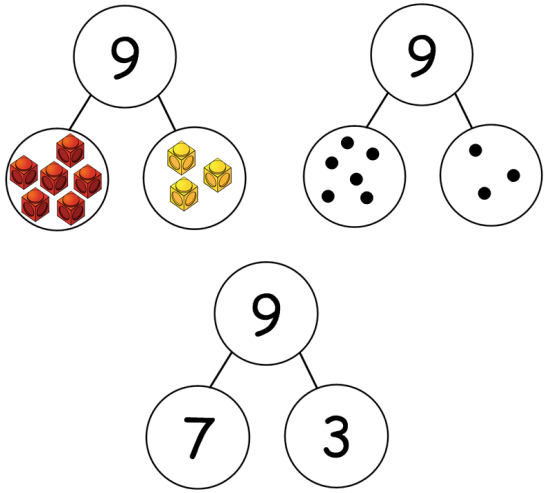
This calculation policy is based on the White Rose calculation policy (2022) and has been produced to ensure consistency and progression in teaching throughout the school in line with the National Curriculum (2014). It aims to give an overview of the key calculation strategies that we be taught in each year group and the concrete and pictorial representation that can be used to support these. The policy demonstrates the progression in each of the four operations that the children will typically follow. Each stage builds upon the previous experience and knowledge .

Children will develop calculation skills through a combination of practical, oral and mental activities. Although the focus of this policy is on pencil and paper procedures , it is important to recognise that in every written method there is an element of mental processing. Written calculation strategies will therefore be taught alongside mental calculation strategies and should be seen as complimentary to and not as separate from them. Informal written recording will take place regularly and it is an important part of learning and understanding. More formal written methods follow only when the child is bale to use a wide range of mental calculation strategies.

All the calculations and methods should be taught with the key aims of the curriculum.. These are fluency, reasoning and problem solving and children should be provided with opportunities to demonstrate this.

Representations used in our school

Part-whole Model

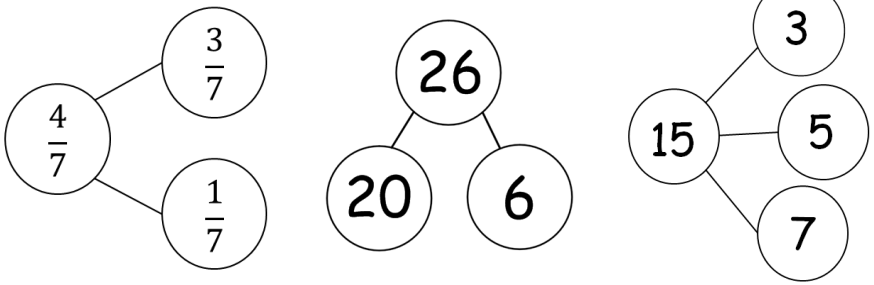


7 + 3 = 9

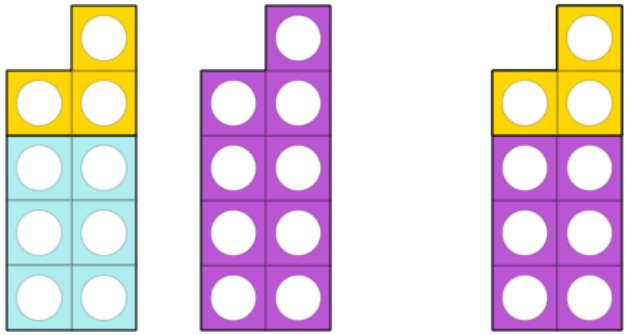
3 + 7 = 9

9 − 3 = 7

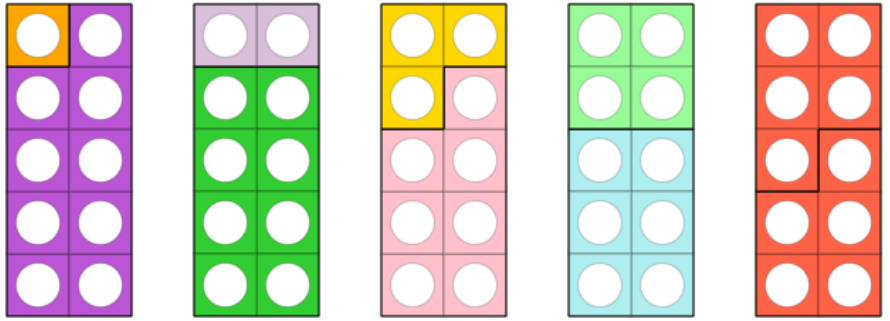
9 − 7 = 3



Number Shapes

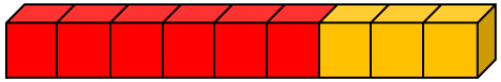


6 + 3 = 9 9 = 6 + 3 9 - 3 = 6

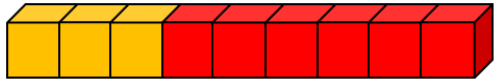


9 + 1 = 10 8 + 2 = 10 7 + 3 = 10 6 + 4 = 10 5 + 5 = 10

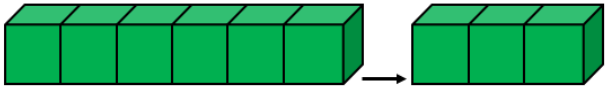
Cubes



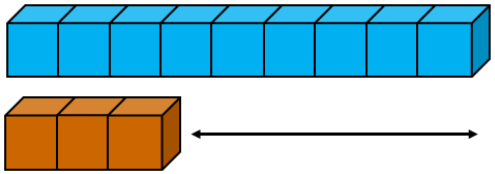
9 = 6 + 3



9 = 3 + 6



9 - 3 = 6

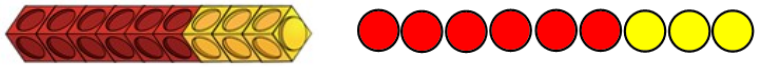


9 - 3 = 6

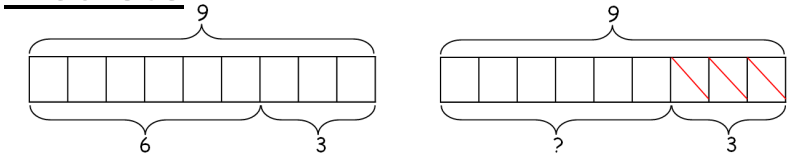
Everyday objects

Bar Model

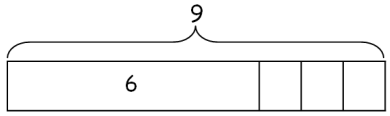
Concrete



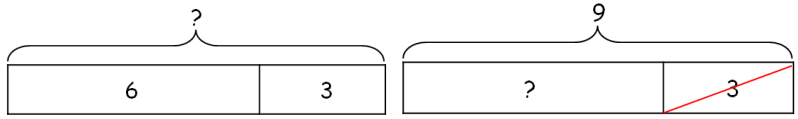
Discrete

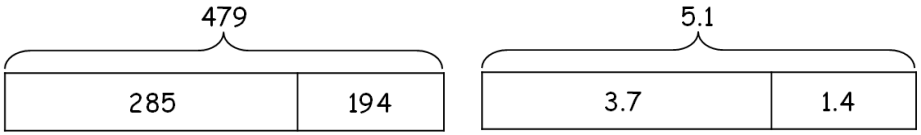


Combination



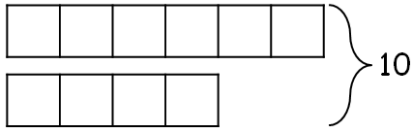
Continuous



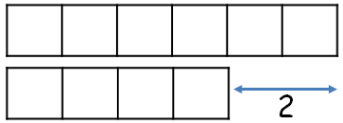


Bar Model (Multiple)

Discrete

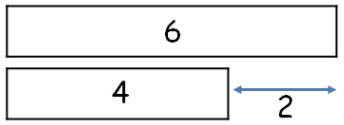


6 + 4 = 10

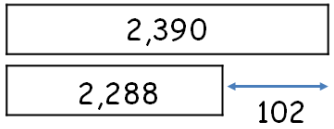


6 - 2 = 4

Continuous

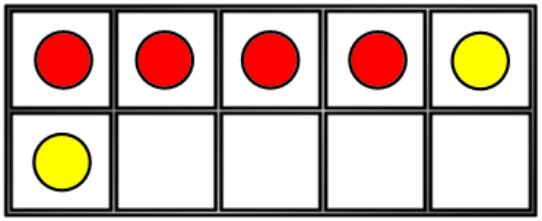


6 - 2 = 4



2,390—2,288 = 102

Tens Frames (within 10)



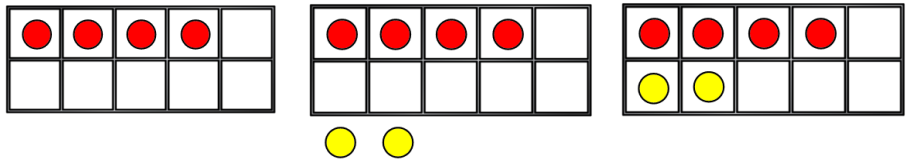
4 + 2 = 6

2 + 4 = 6

6 - 2 = 4

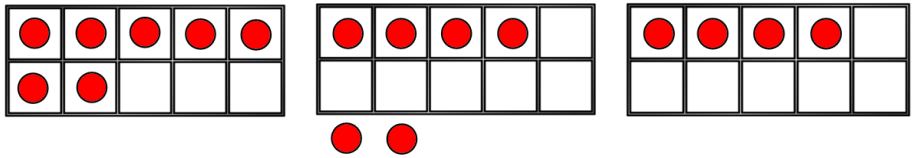
6 - 4 = 2

First Then Now



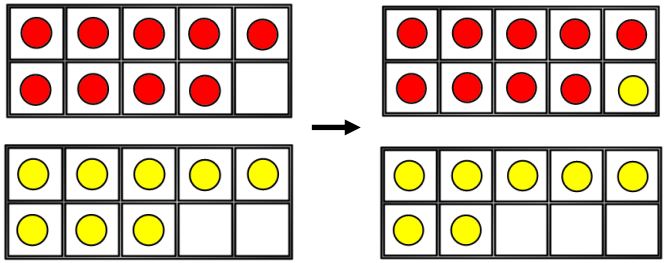
4 + 2 = 6

First Then Now



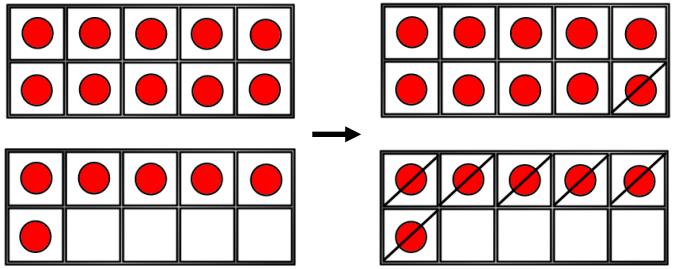
6 + 2 = 4

Tens Frames (within 20)



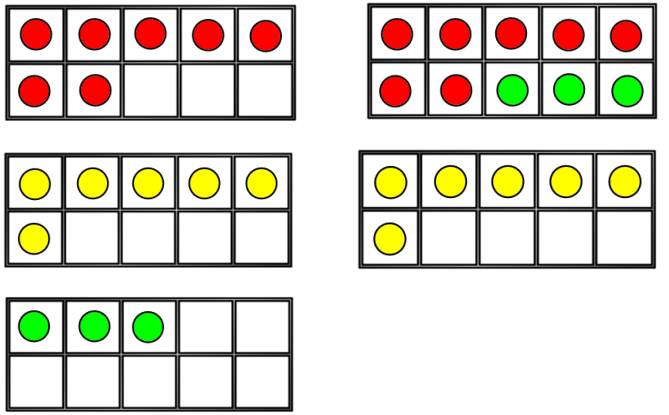
9 + 7 = 16

1 6



16 + 7 = 9

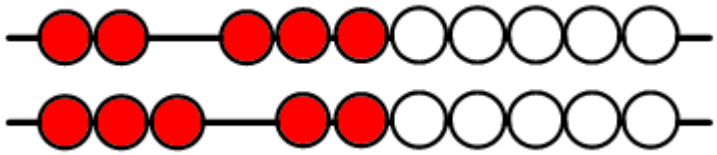
1 6



7 + 6 + 3 = 16

10

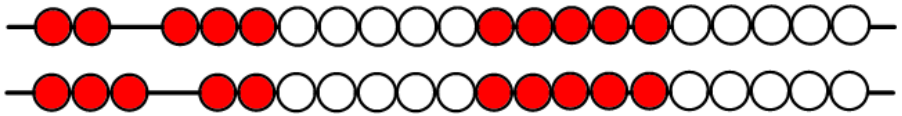
Bead Strings



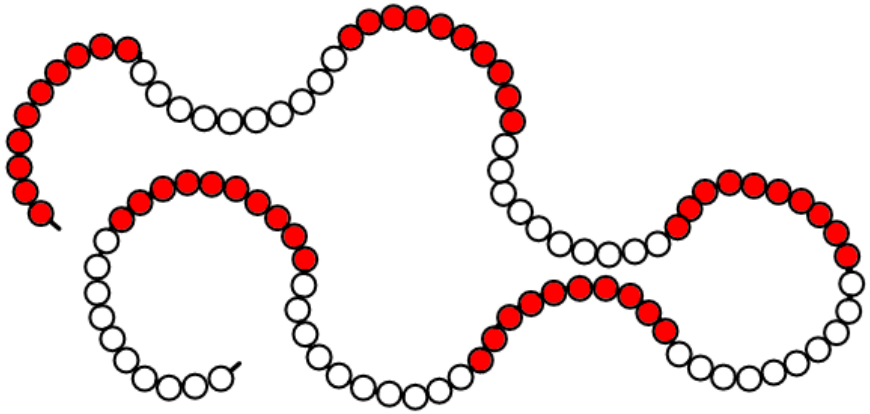
2 + 8 = 10

3 + 7 = 10

2 + 18 = 20

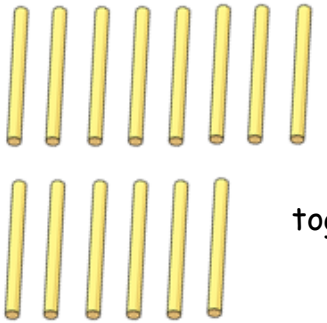


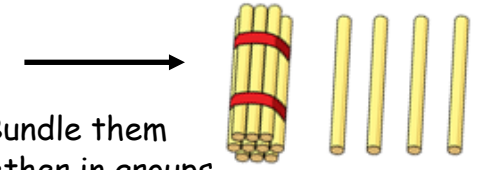
3 + 17 = 20



Straws /Sticks

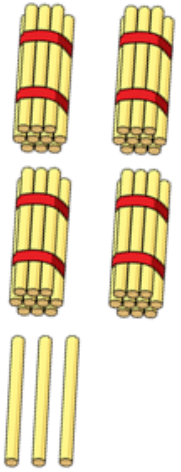
8 + 6 = 14



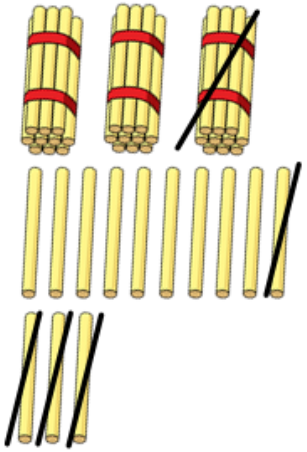


Bundle them together in groups of 10.

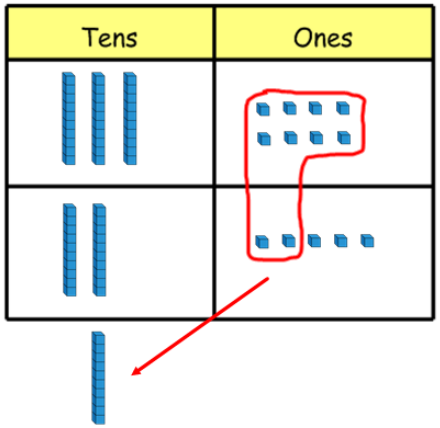
43 - 15 = 34



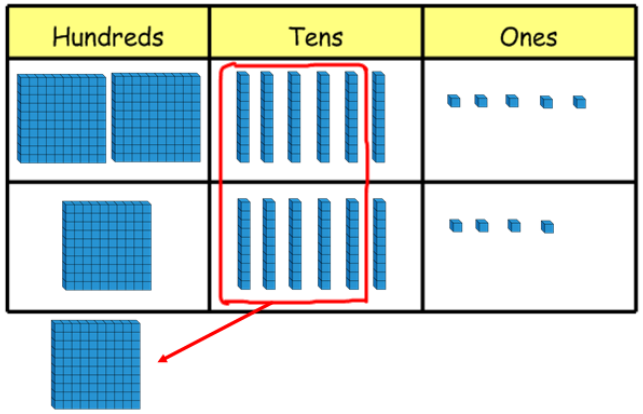
Unbundle a group of 10 straws



Base 10 (Addition)

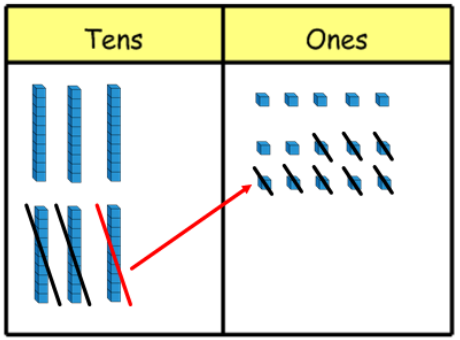


$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$

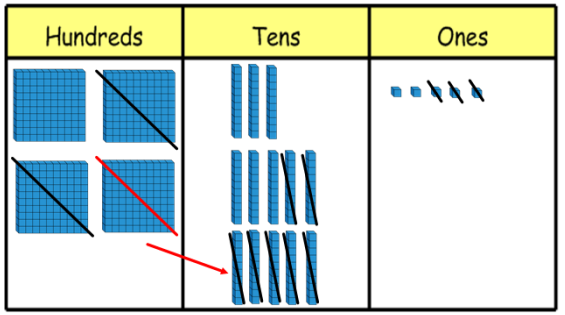


$$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$

Base 10 (Subtraction)

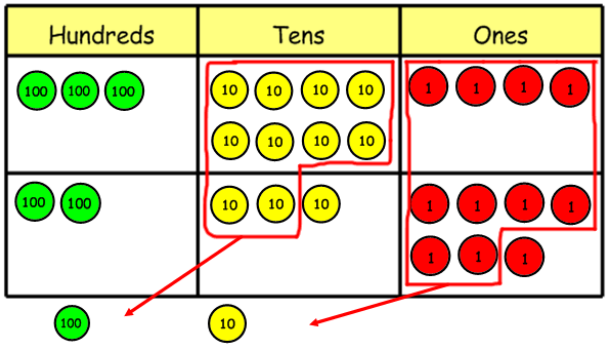


$$\begin{array}{r} {}^{5}\not{6}\ {}^{1}5 \\ -\ 28 \\ \hline 35 \end{array}$$

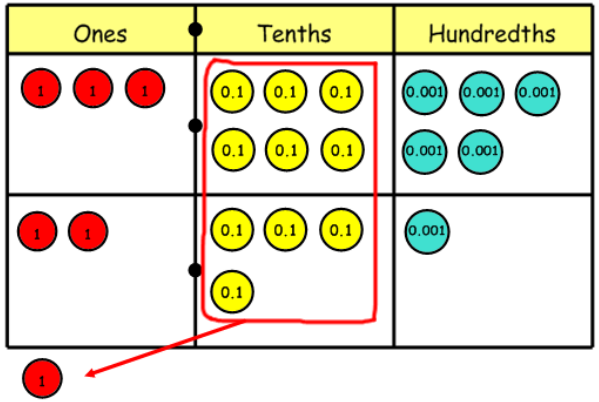


$$\begin{array}{r} {}^{3}\not{4}\ {}^{1}35 \\ -\ 273 \\ \hline 262 \end{array}$$

Place Value Counters (+)

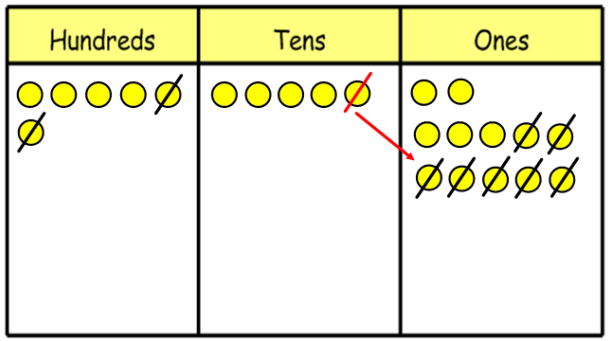


$$\begin{array}{r} 3\,8\,4 \\ +\,2\,3\,7 \\ \hline 6\,2\,1 \\ \hline 1\ \ 1 \end{array}$$

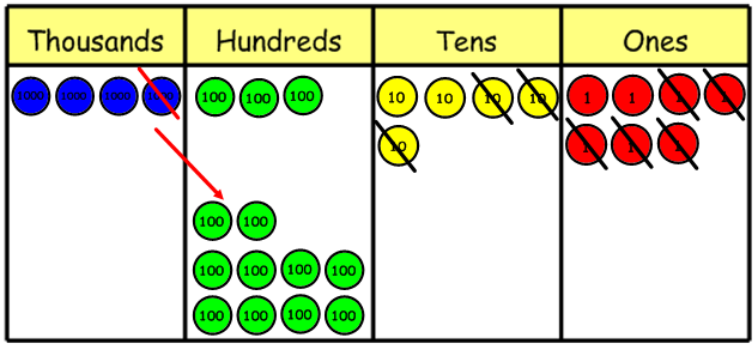


$$\begin{array}{r} 3.6\,5 \\ +\,2.4\,1 \\ \hline 6.0\,6 \\ \hline 1\ \ 1 \end{array}$$

Place Value Counters (-)



$$\begin{array}{r} {\scriptstyle 4\ \ 1} \\ 6\,\not{5}\,2 \\ -\,2\,0\,7 \\ \hline 4\,4\,5 \end{array}$$



$$\begin{array}{r} {\scriptstyle 3\ \ 1} \\ \not{4}\,3\,5\,7 \\ -\,2\,7\,3\,5 \\ \hline 1\,6\,2\,2 \end{array}$$

Addition

Progression through representation in Addition

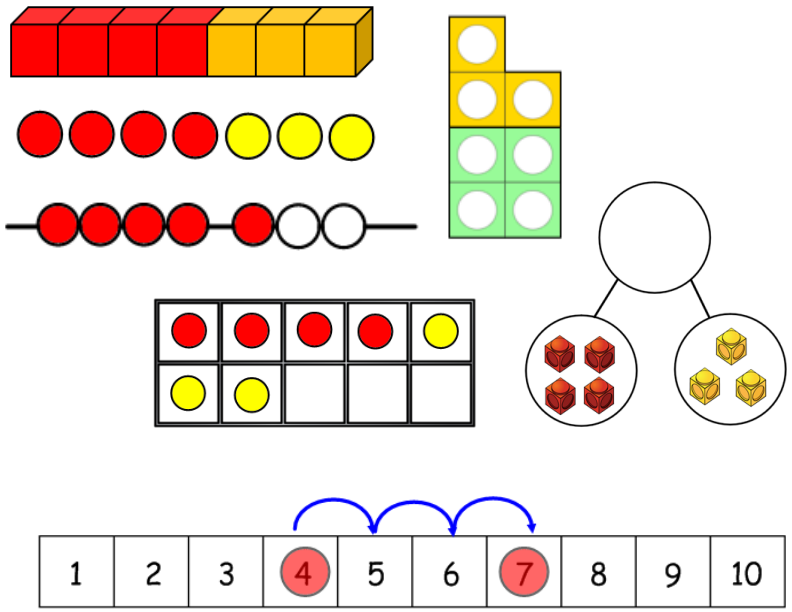
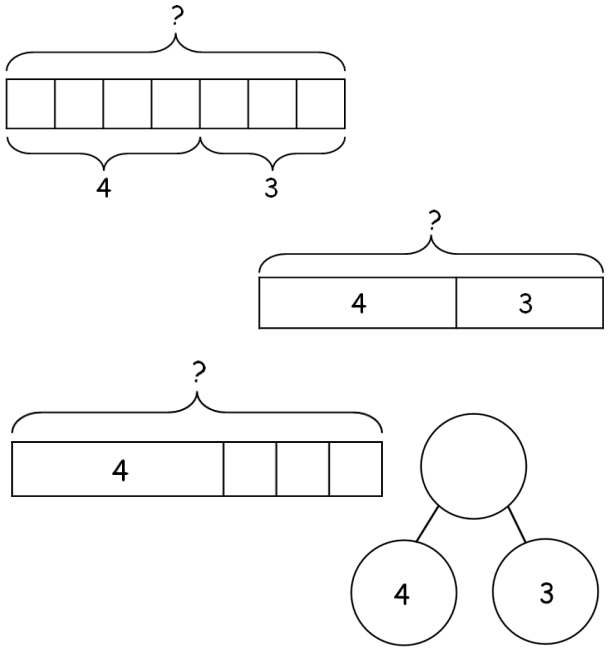
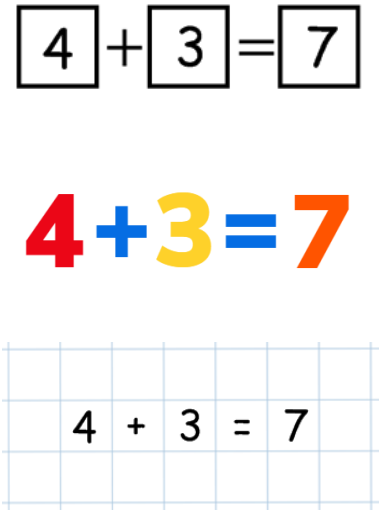
Skill	Year	Representations and Models	
Find one more than a given number (to 5/to 10)	EYFS	Fingers Objects in the every-day environment (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Add two 1-digit numbers to 10	EYFS	Fingers Objects in the every-day environment (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Add two 1-digit numbers to 10	1	Part-whole model Bar Model Number Shapes (Numicon)	Ten frames + counters (within 10) Bead strings (10) Number tracks
Add 1 and 2-digit numbers to 20	1	Part-whole model Bar model Number shapes (Numicon) Ten frames (within 20)	Bead strings (20) Number tracks Number lines (labelled) Straws
Add three 1-digit numbers	2	Part-whole model Bar model	Tens frames (within 20) Number shapes (Numicon)

Skill	Year	Representations and Models	
Add 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Hundreds square
Add two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column addition
Add with up to 3-digits	3	Part-whole model Bar model	Base 10 Place value counters Column addition
Add with up to 4-digits	4	Part-whole model Bar model	Base 10 Place value counters Column addition
Add with more than 4-digits	5	Part-whole model Bar model	Place value counters Column addition
Add with up to 3 decimal places	5	Part-whole model Bar model	Place value counters Column addition

Year 1

Skill: Add 1-digit numbers within 10

Big Idea: When adding numbers to 10, children can explore both aggregation (combining two or more parts to make a whole) and augmentation (when a quantity is increased by another). The part-whole model, discrete and continuous bar model, number shapes and tens frames support aggregation. The combination bar model, tens frame, bead string and number track all support augmentation.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add, plus, more, more than, 'and', sum, total, equal to, is the same as, altogether, parts and wholes

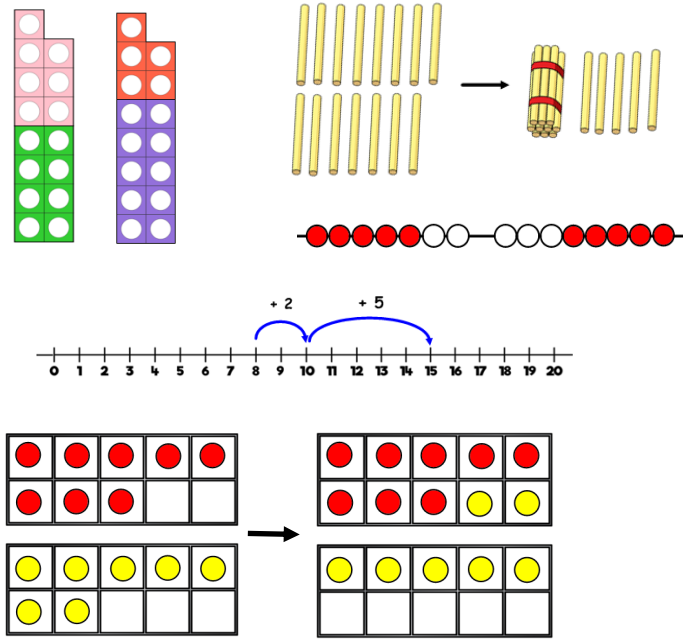
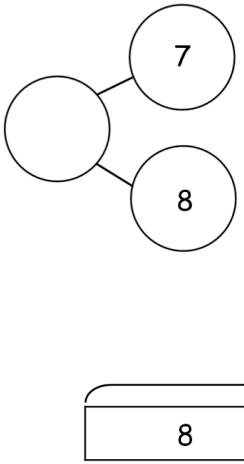
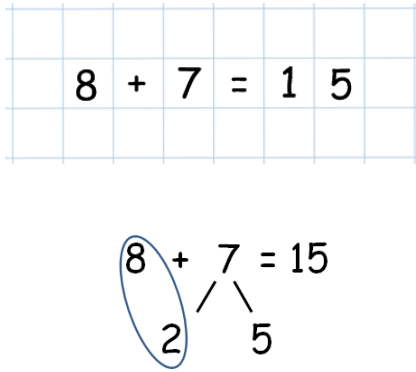
"____red counters **plus** ____ yellow counters is **equal** to ____counters"

"____ is the **part**. ____ is the **part**. ____ is the **whole**"

Year 1 and 2

Skill: Add 1 and 2-digit numbers to 20

Big Idea: When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Different manipulatives can be used to represent this exchange (changing a number or expression for another of equal value). Use concrete resources alongside number lines to support children in understanding how to partition their jumps.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add, plus, more, more than, 'and', sum, total, equal to, is the same as, altogether, parts and wholes

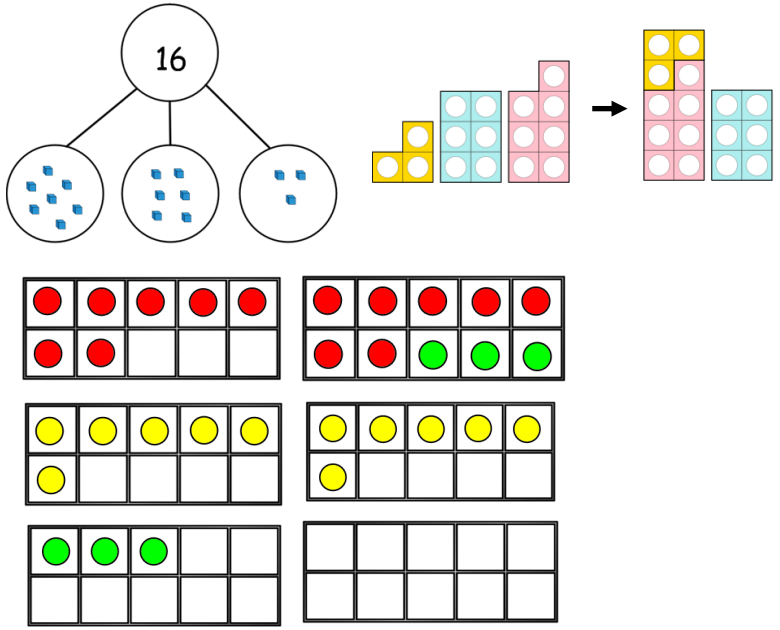
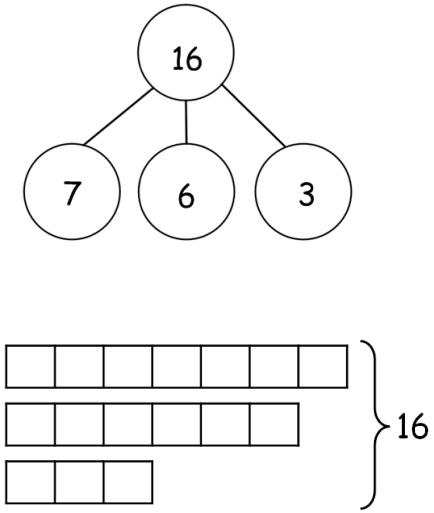
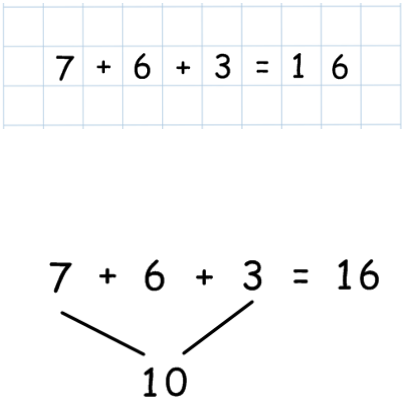
Number Stories: **First** there were ___ cars in the car park. **Then** ___ **more** cars parked in the car park. **Now** there are ___ cars in the car park **altogether**.

"There are ___ red counters. There are ___ yellow counters. **Altogether** there are ___ counters. ___ + ___ = ___ ___ + ___ =___ "

Year 2

Skill: Add three 1-digit numbers

Big Idea: When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently. This supports children in their understanding of commutativity (that numbers can be combined in any order). Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add, plus, more, more than, 'and', sum, total, equal to, is the same as, altogether, parts and wholes

"When we add three numbers the total will be the same whichever pair we add first"

"There are ___, ___ and ___. Altogether there are ___."

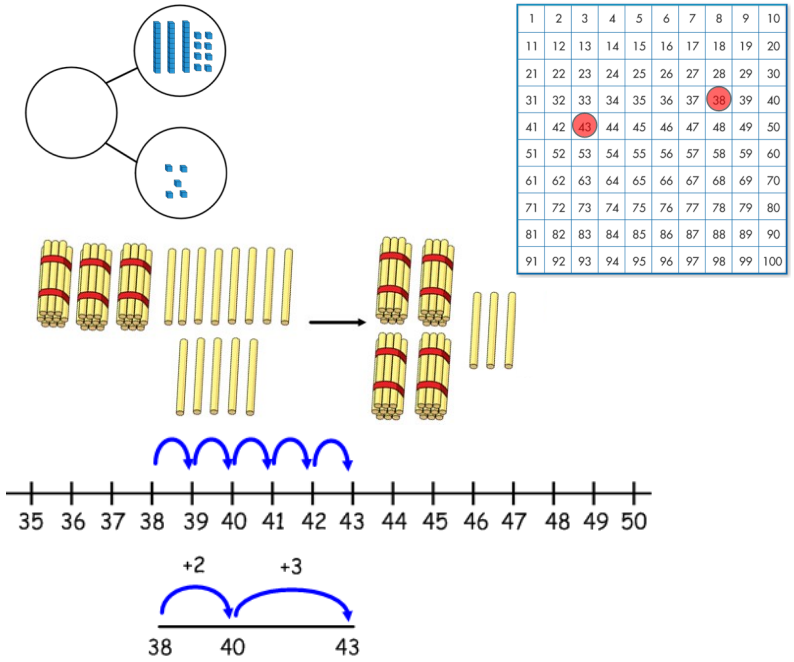
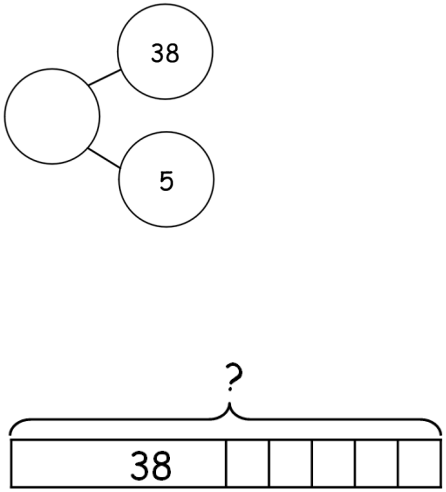
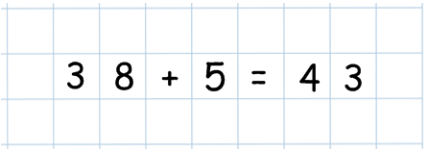
" First we had ____. Then we had ____. Then we had ____. Now we have ____"

" We can look for pairs of addends which sum to 10. ____ plus ____ is equal to ten, then ten plus ____is equal to ____ ."

Year 2 and 3

Skill: Add 1-digit and 2-digit numbers to 100

Big Idea: When adding single digits to a two-digit number, children should be encouraged to count on from the larger number. They should also apply their knowledge if number bonds to add more efficiently e.g. 8 + 5 = 13 so 38 + 5 = 43. Hundreds squares and straws can support children to find the number bonds to 10.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', ones, tens

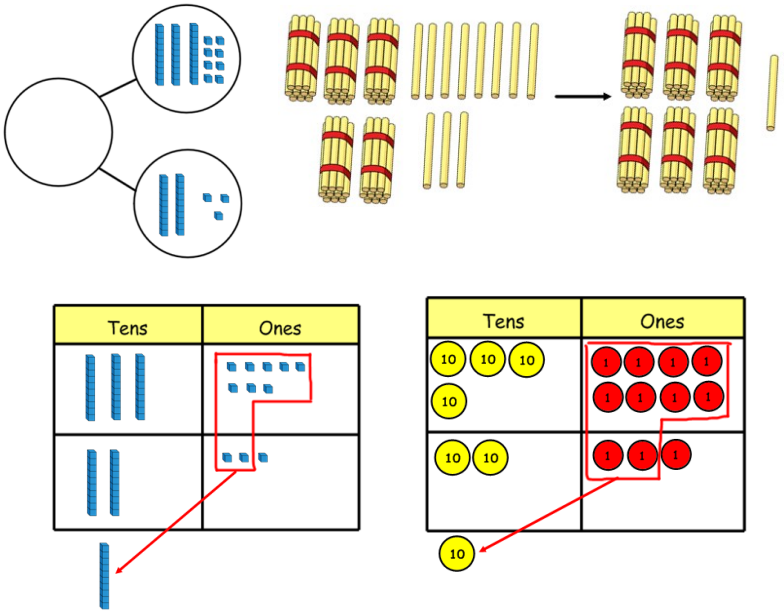
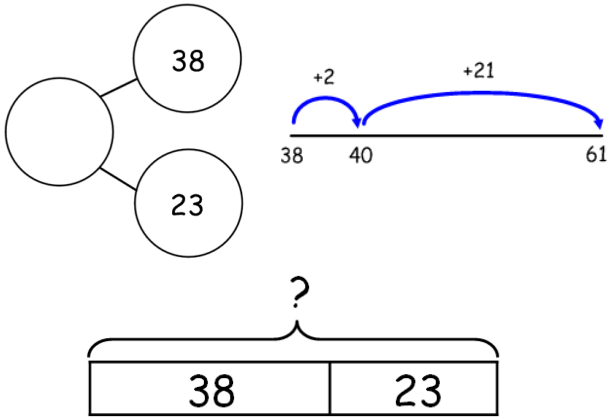
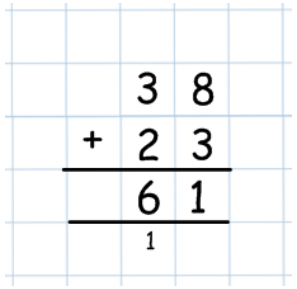
"38 plus 5 is equal to 43"

" First I partition the 38 into 3 tens and 8 ones, and the 5 into 0 tens and 5 ones. 8 ones plus 5 ones is equal to 13 ones. 30 plus 13 is equal to 43 . So 38 plus 5 is equal to 43 ."

Year 2 and 3

Skill: Add two 2-digit numbers to 100

Big Idea: At this stage encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient. Children can also use a blank number lines to count on to find the total. Encourage them to jump to become more efficient.

Concrete	Pictorial	Abstract
		3 8 + 2 3 = 4 3 

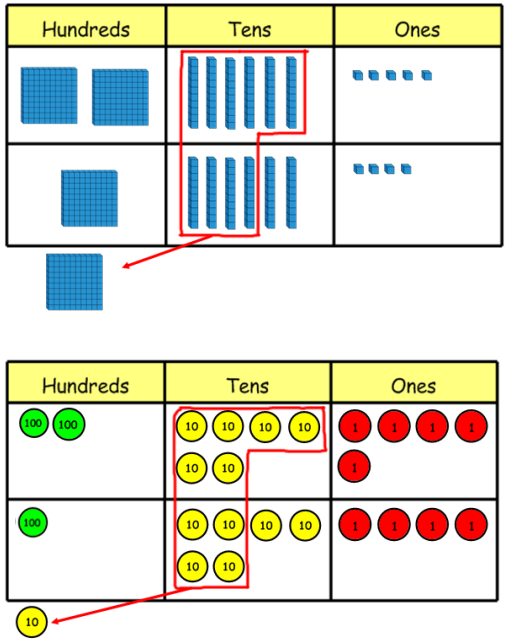
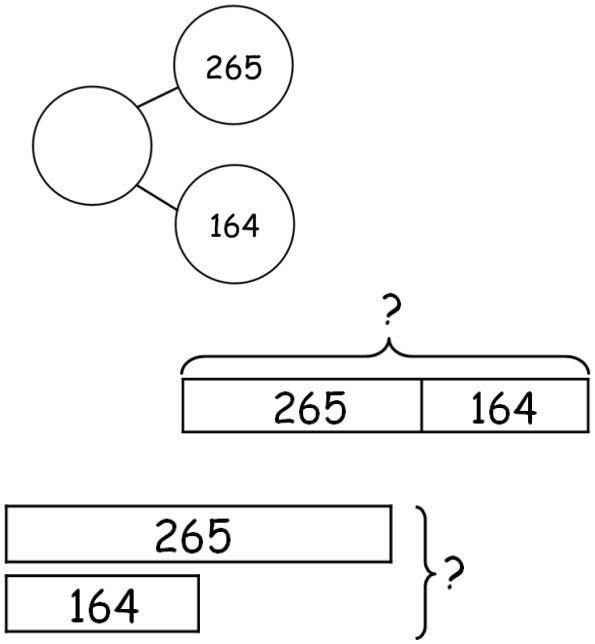
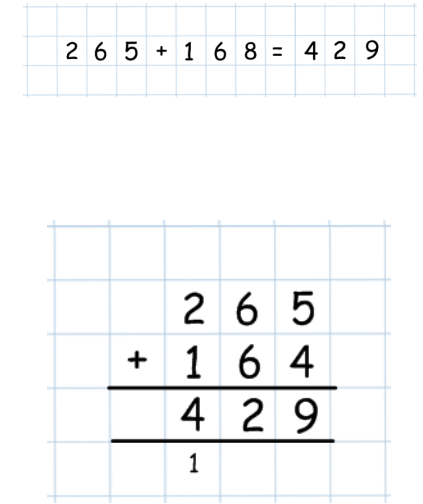
Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', ones, tens, partition, regroup.

"First I **partition** the **38** into **3 tens** and **8 ones**, and the **23** into **2 tens** and **3 ones. 8 ones plus 3 ones** is **equal to 11 ones.** If the **column sum** is **equal** to **ten or more**, we must **regroup** - **11 ones** becomes **1 more ten in the tens column. 1 one remains in the ones column**. **3 tens plus 2 tens is equal to 5 tens, plus 1 ten is equal to 6 tens. So 38 plus 23 is equal to 61."**

Year 3

Skill: Add numbers with up to 3-digits

Big Idea: Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3-digits. Ensure children write out their calculation alongside any concrete resources so that they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', ones, tens, hundreds, regroup.

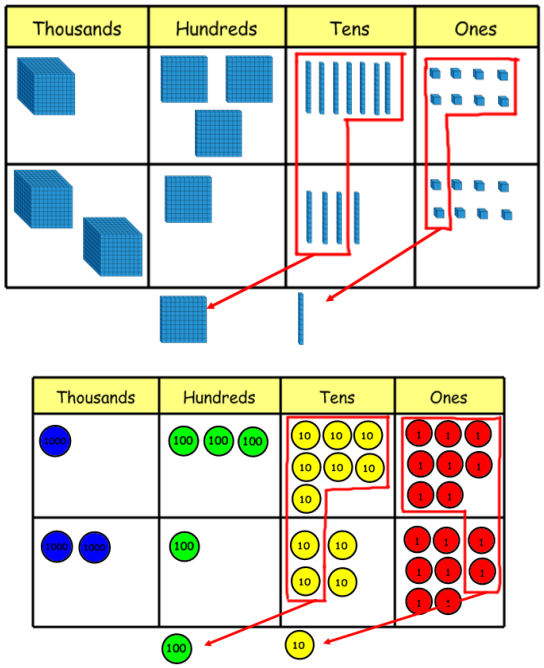
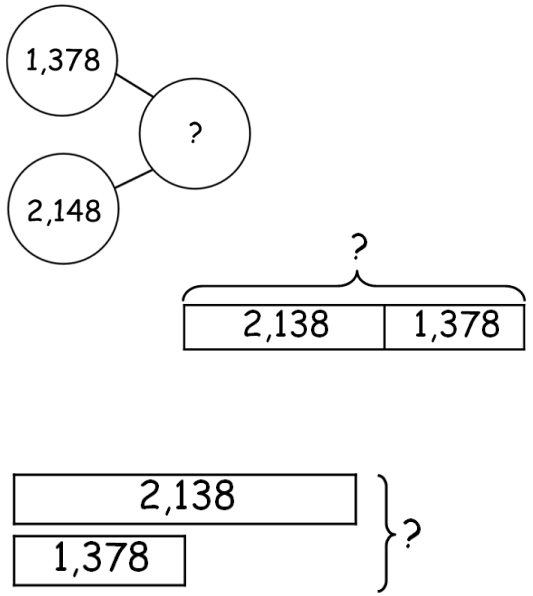
"In column addition, we start at the right-hand side"

" 5 one(s) plus 4 one(s) is equal to 9 ones. 6 ten(s) plus 6 ten(s) is equal to 12 tens. If the column sum is equal to ten or more, we must regroup. 12 tens is equal to 1 hundred and 2 tens. 2 hundreds plus 1 hundred is equal to 3 hundreds plus another hundred is equal to 4 hundreds. So, 265 plus 164 is equal to 429."

Year 4

Skill: Add numbers with up to 4-digits

Big Idea: Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4-digits. Ensure children write the calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

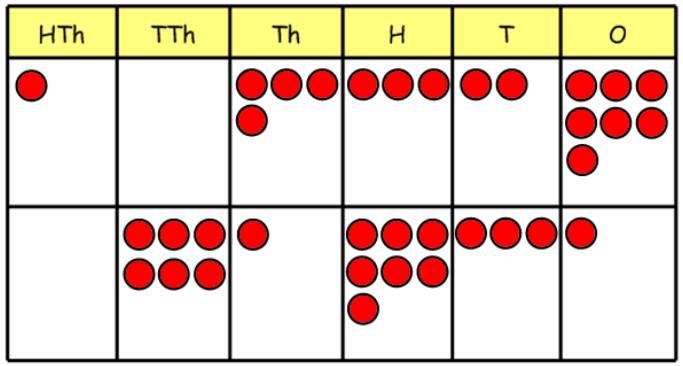
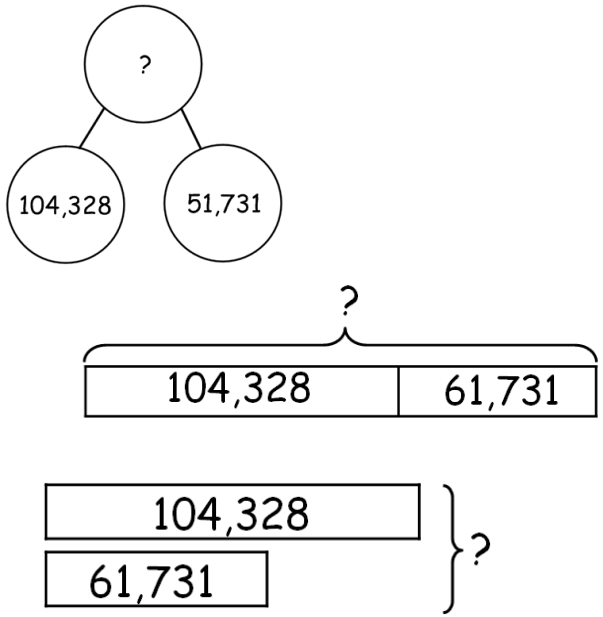
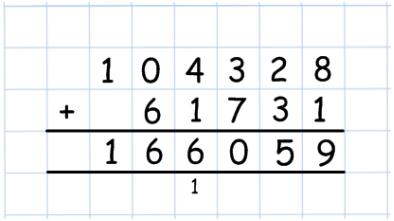
Concrete	Pictorial	Abstract
		1 3 7 8 + 2 1 4 8 = 3 5 2 6 1 3 7 8 + 2 1 4 8 3 5 2 6 1 1

Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', ones, tens, hundreds, thousands, partition, regroup.

Year 5 and 6

Skill: Add numbers with more than 4-digits

Big Idea: Place value counters or plain counters on a place value grid are the most effectives concrete resources when adding numbers with more than 4-digits. At this stage, children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently.

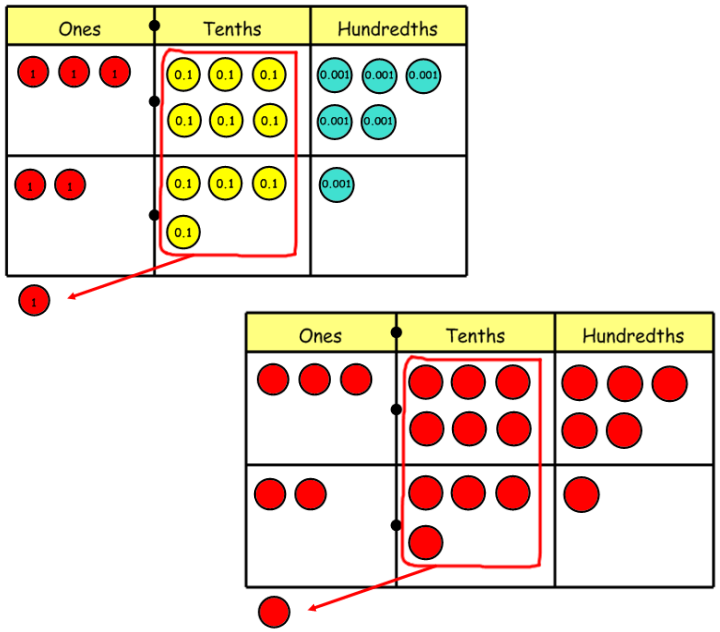
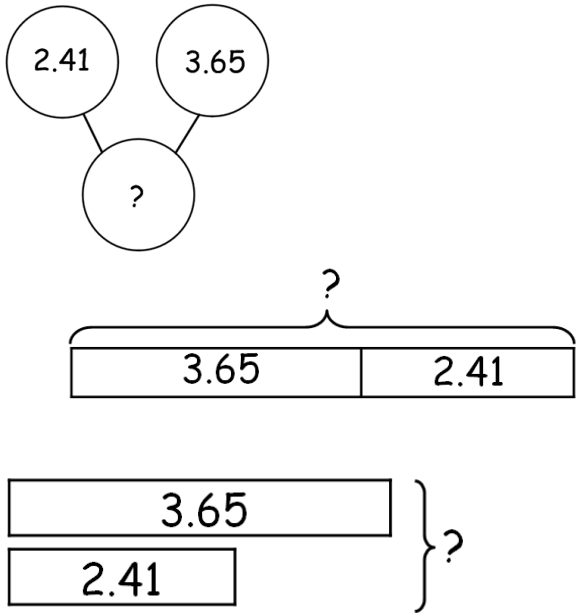
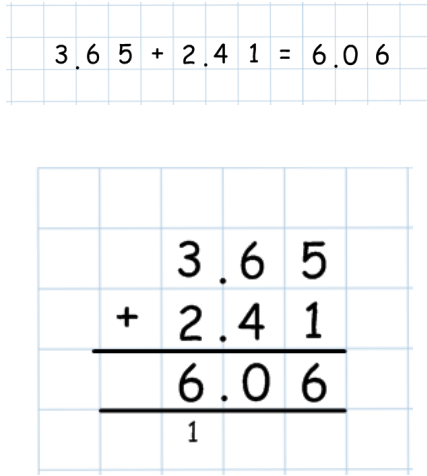
Concrete	Pictorial	Abstract
		

Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', ones, tens, hundreds, thousands, ten thousands, hundred thousands, partition, regroup.

Year 5 and 6

Skill: Add with up to 3 decimal places

Big Idea: Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1, 2, and then 3 decimal places. Ensure children have experiences of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

Concrete	Pictorial	Abstract
		

Vocabulary: addition, add (+), total, plus, sum, more , altogether, equal (=), 'is the same as', decimal, ones, tenths, hundredths, partition, regroup.

Subtraction

Progression through representation in Subtraction

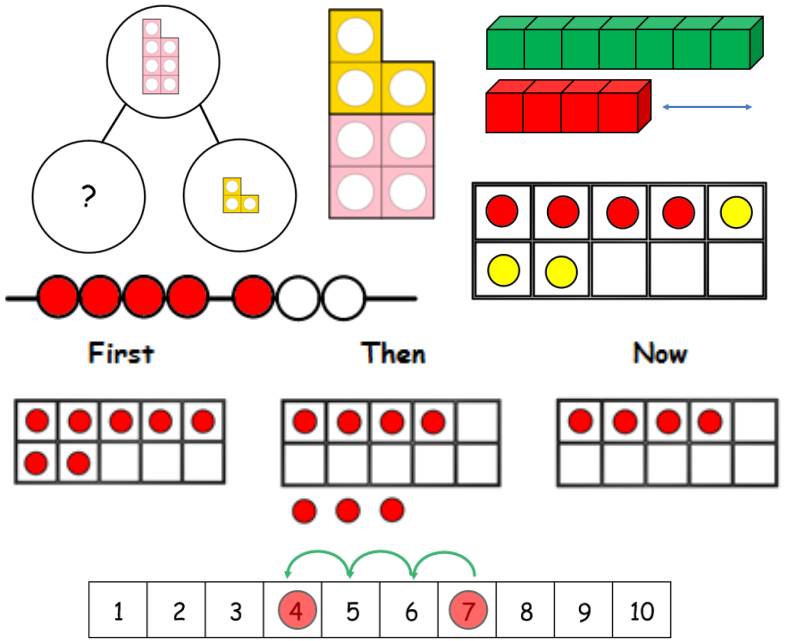
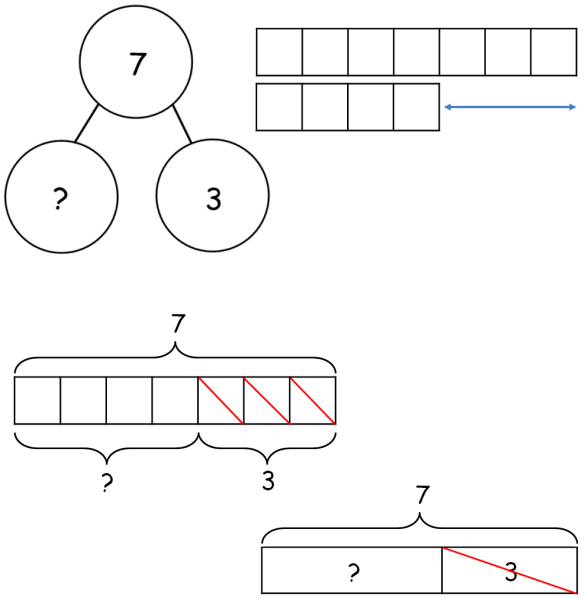
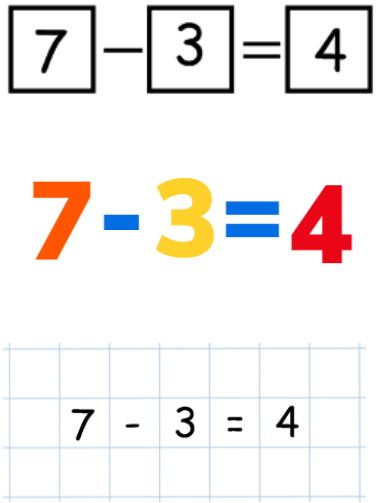
Skill	Year	Representations and Models	
Find one less than a given number (to 5/to 10)	EYFS	Fingers Objects in the every-day environment (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Subtract two 1-digit numbers within 10	EYFS	Fingers Objects in the every-day environment (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Subtract two 1-digit numbers within 10	1	Part-whole model Bar Model Number Shapes	Ten frames (within 10) Bead strings (10) Number tracks
Subtract 1 and 2-digit numbers within 20	1	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead strings (20) Number tracks Number lines (labelled) Straws
Subtract 1 and 2-digit Numbers within 100	2	Part-whole model Bar model Number lines (labelled_	Number lines (blank) Straws Hundred square

Skill	Year	Representations and Models	
Subtract two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column subtraction
Subtract with up to 3-digits	2	Part-whole model Bar model	Base 10 Place value counters Column subtraction
Subtract with up to 4-digits	3	Part-whole model Bar model	Base 10 Place value counters Column subtraction
Subtract with more than 4-digits	4	Part-whole model Bar model	Base 10 Place value counters Column subtraction
Subtract with up to 3 decimal places	5	Part-whole model Bar model	Place value counters Column subtraction

Year 1

Skill: Subtract 1-digit numbers within 10

Big Idea: Part-whole models, bar models, ten frames and number shapes support partitioning (splitting a number into its component parts). Ten frames, number tracks, single bar models and bead strings support reduction (subtraction as take-away). Cubes and bar models with two bars can support finding the difference.

Concrete	Pictorial	Abstract
		

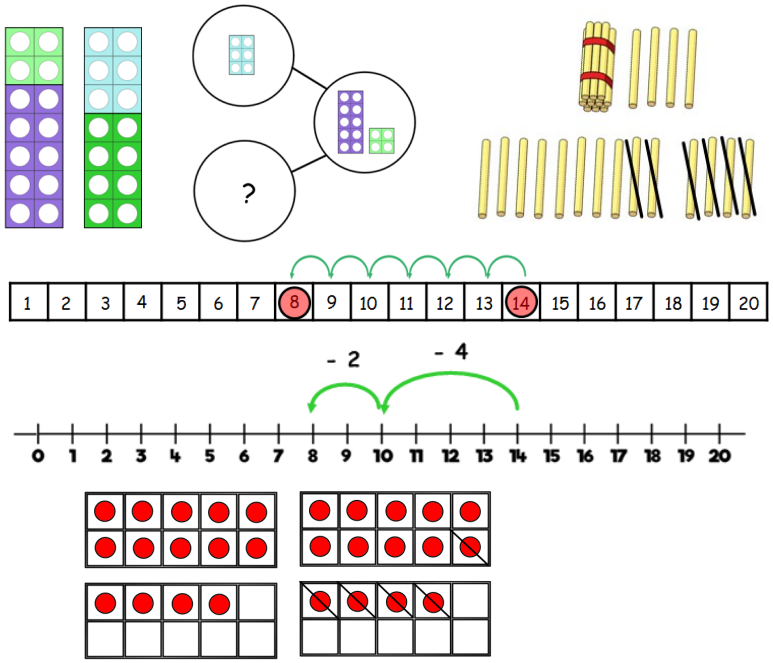
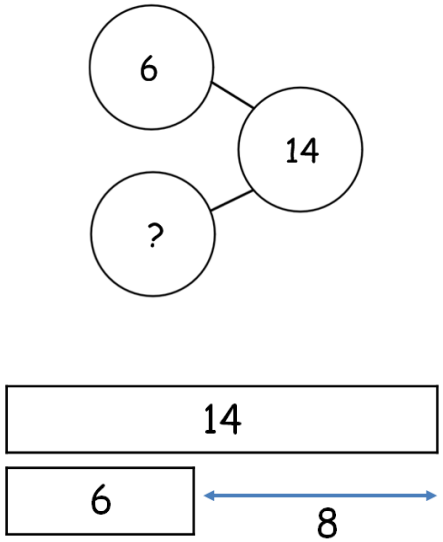
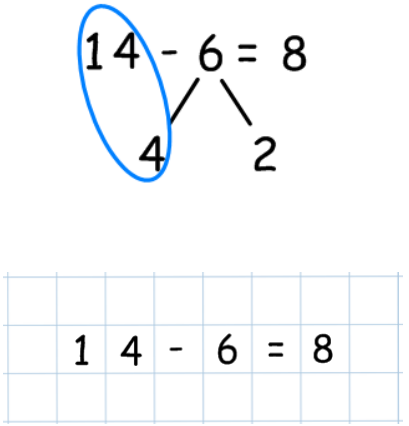
Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, the difference between.

Number Stories: "At First there were **7 birds. Then 3** flew away**. Now** there are **4 birds. 7 – 3 = ___ "**

Year 1 and 2

Skill: Subtract 1 and 2-digit numbers within 20

Big Idea: When subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Children should be encourages to find the number bond to 10 when partitioning the subtracted number. Ten frames, number shapes and number lines are particularly useful for this.

Concrete	Pictorial	Abstract
		

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, the difference between

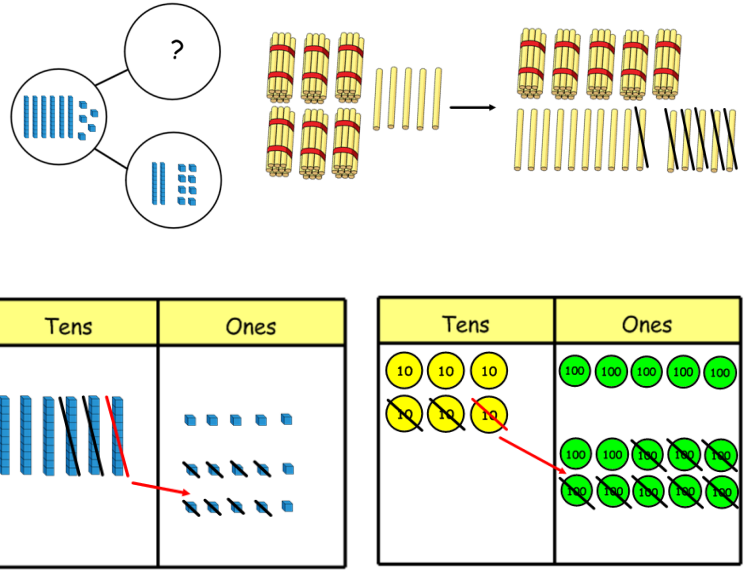
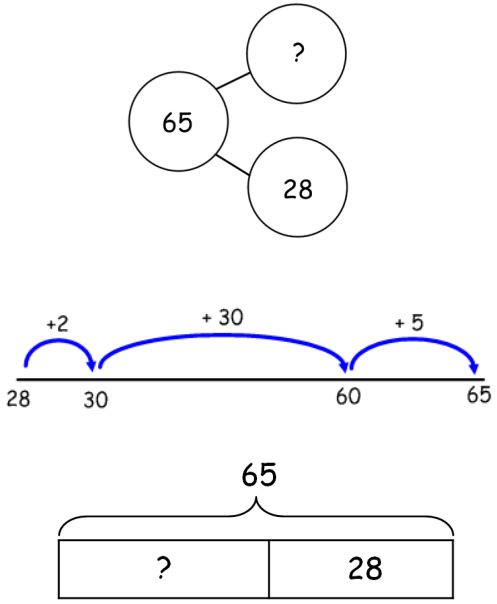
Number Stories: "First there were **14 biscuits. Then 6** were eaten**. Now** there are **8 biscuits**. **16 – 5 = 8** "

"The **difference** between 14 and 6 is 8. 14 - 6 = 8"

Year 2

Skill: Subtract 1 and 2-digit numbers within 100

Big Idea: At this stage, encourage children to use the formal column method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient. Children can also use a blank number line to count on to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

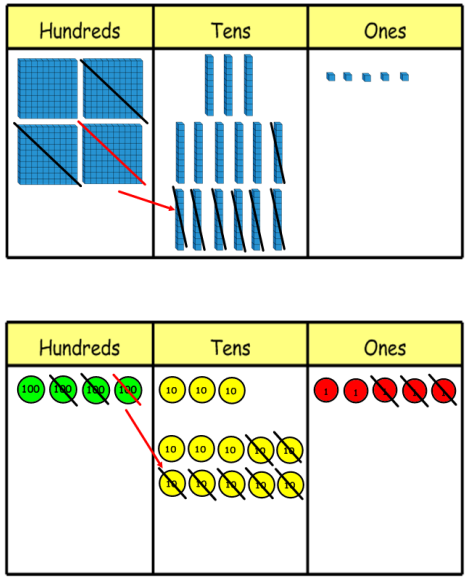
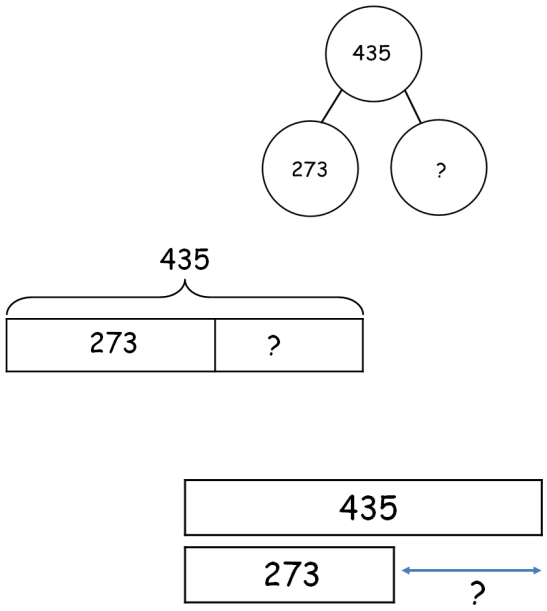
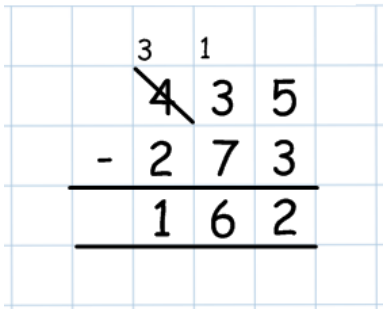
Concrete	Pictorial	Abstract
		6 5 - 2 8 = 3 7 5 1 6 5 - 2 8 3 7

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, leaves, the difference between, column subtraction, exchange, inverse, ones, tens

Year 3

Skill: Subtract numbers with up to 3-digits

Big Idea: Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 3-digits. Ensure children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

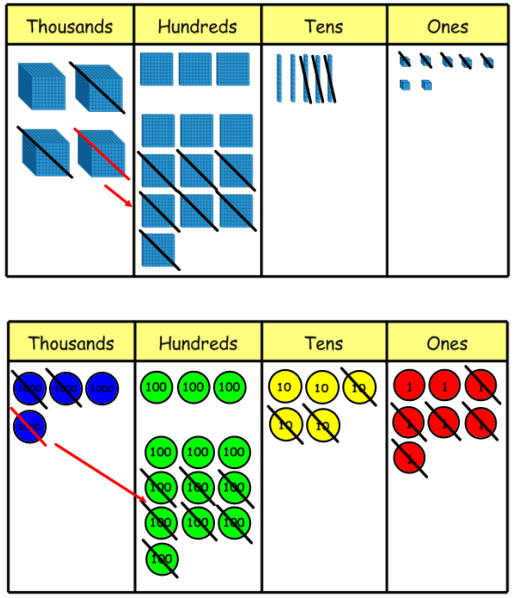
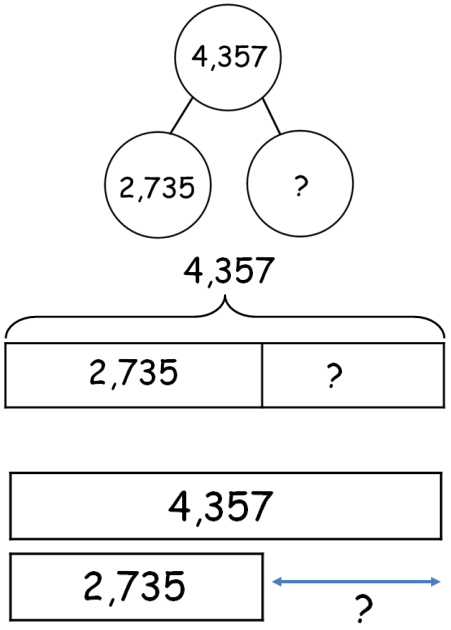
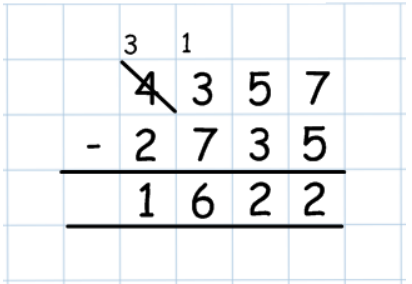
Concrete	Pictorial	Abstract
		

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, leaves, the difference between, column subtraction, exchange, inverse, ones, tens, hundreds.

Year 4

Skill: Subtract numbers with up to 4-digits

Big Idea: Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4-digits. Ensure that children write out their calculation alongside any concrete resources so they can see the links to the written column method. Plain counters on a place value grid can also be used to support learning.

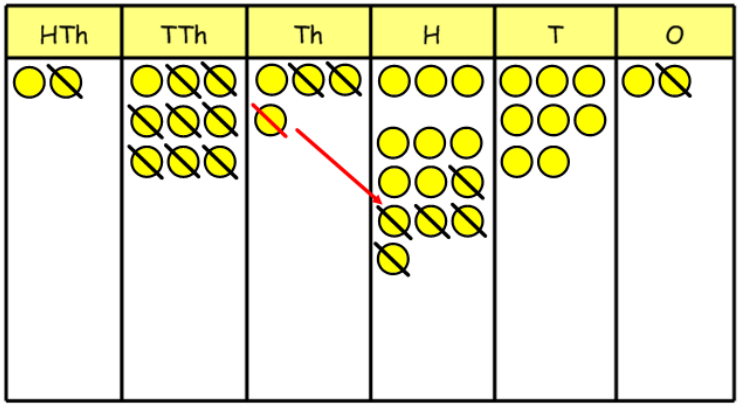
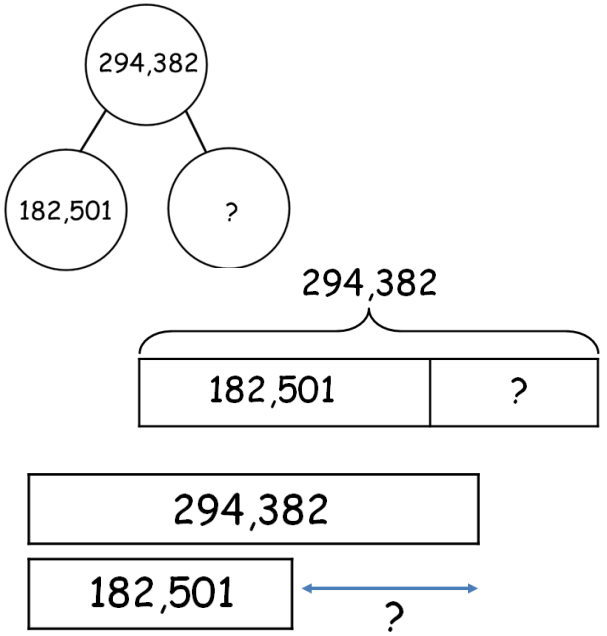
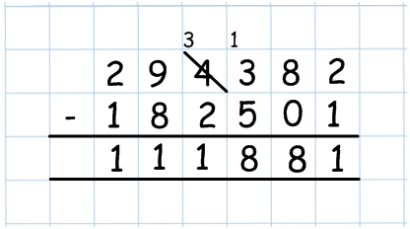
Concrete	Pictorial	Abstract
		

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, leaves, the difference between, column subtraction, exchange, inverse, ones, tens, hundreds, thousands

Year 5/6

Skill: Subtract numbers with up to 4-digits

Big Idea: Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting number with more than 4-digits. At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

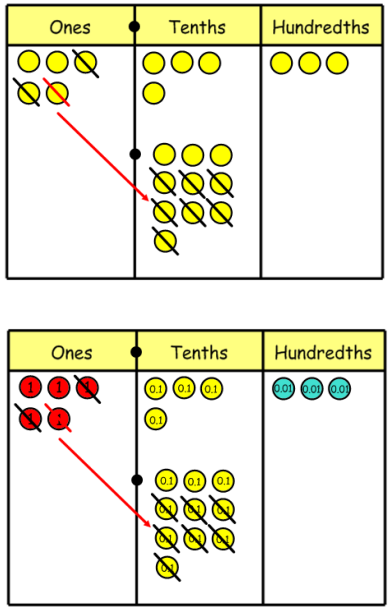
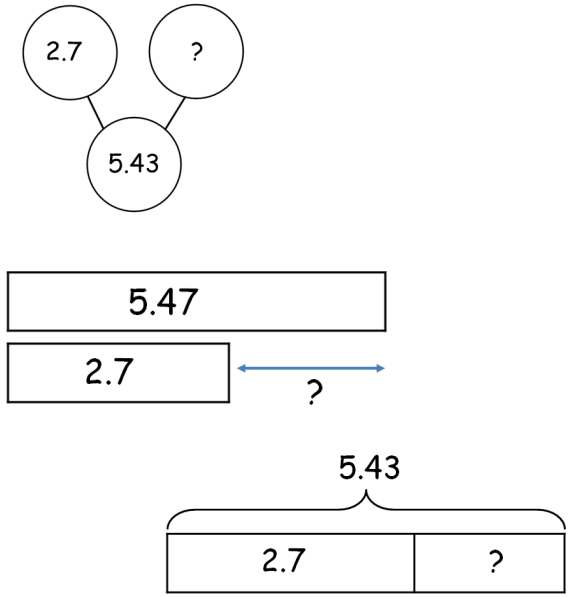
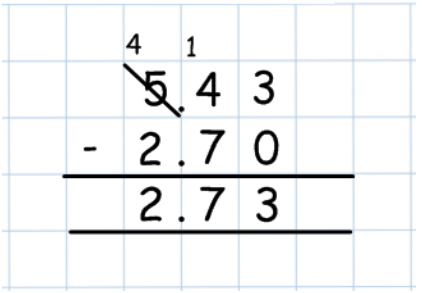
Concrete	Pictorial	Abstract
		

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, leaves, the difference between, column subtraction, exchange, inverse, ones, tens, hundreds, ten thousands, hundred thousands, millions.

Year 5/6

Skill: Subtract with up to 3-decimal places

Big Idea: Place value counters and plain counters on a place value grid are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places. Ensure children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.

Concrete	Pictorial	Abstract
		

Vocabulary: subtraction, subtract, 'take away', minus, less, less than, fewer, leaves, the difference between, column subtraction, exchange, inverse, ones, tenths, hundredths.

Multiplication Tables

Progression through representation in Multiplication Tables

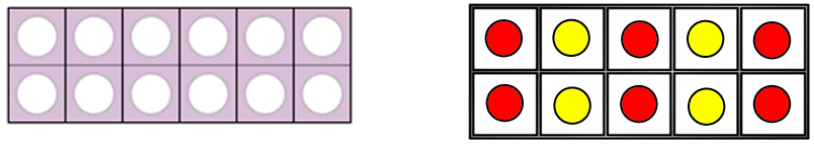
Skill	Year	Representations and Models	
Recall and use multiplication and division facts for the 2-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 5-times table	2	Bar model Number shapes Counters Money	Ten frames Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 10-times table	2	Hundreds square Number shapes Counters Money	Ten frames Bead strings Number lines Base 10
Recall and use multiplication and division facts for the 3-times table		Hundreds square Numbers shapes (Numicon) Counters	Bead strings Number lines Everyday objects

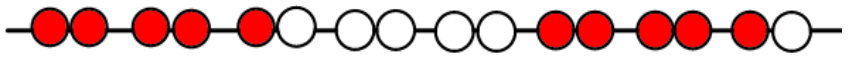
Skill	Year	Representations and Models	
Recall and use multiplication and division facts for the 4-times table	3	Hundred square Numbers shapes (Numicon) Counters	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 8-times table	3	Hundred square Numbers shapes (Numicon)	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 6-times table	4	Hundred square Number shapes (Numicon)	Bead strings Number lines Everyday objects
Recall and use multiplication and division facts for the 7-times table	4	Hundred square Number shapes (Numicon)	Bead strings Number lines
Recall and use multiplication and division facts for the 9-times table	4	Hundred square Number shapes (Numicon)	Bead strings Number lines

Skill	Year	Representations and Models	
Recall and use multiplication and division facts for the 11-times table	4	Hundred square Base 10	Place value counters Number lines
Recall and use multiplication and division facts for the 12-times table	4	Hundred square Base 10	Place value counters Number lines

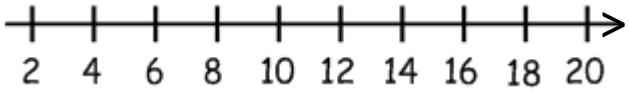
Year 2

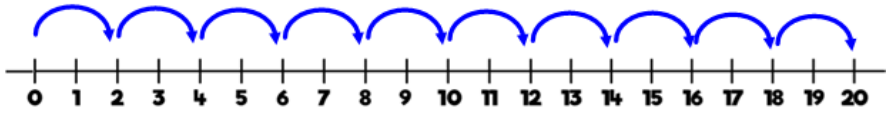
2 Times Table



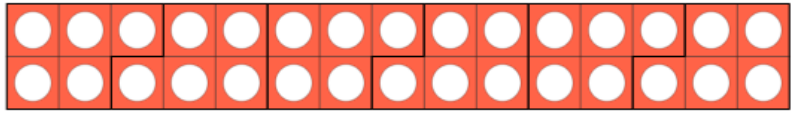


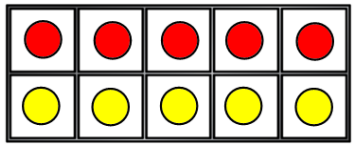
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40



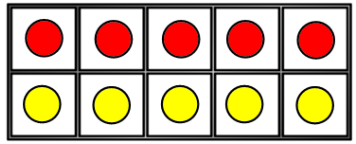


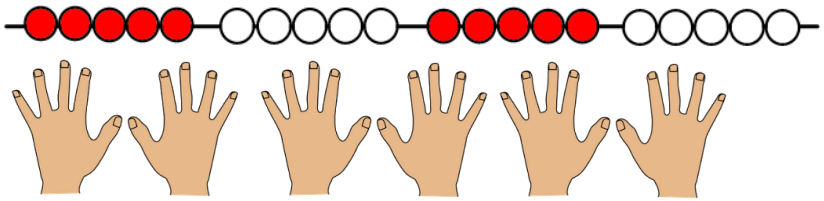
5 times table

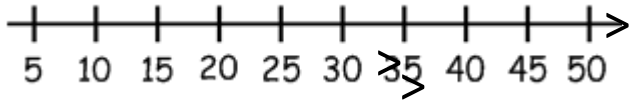


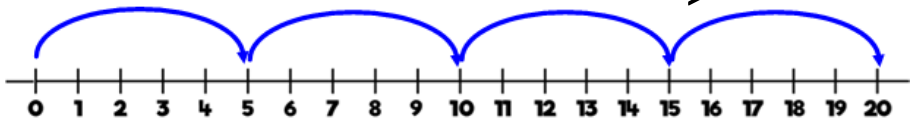


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



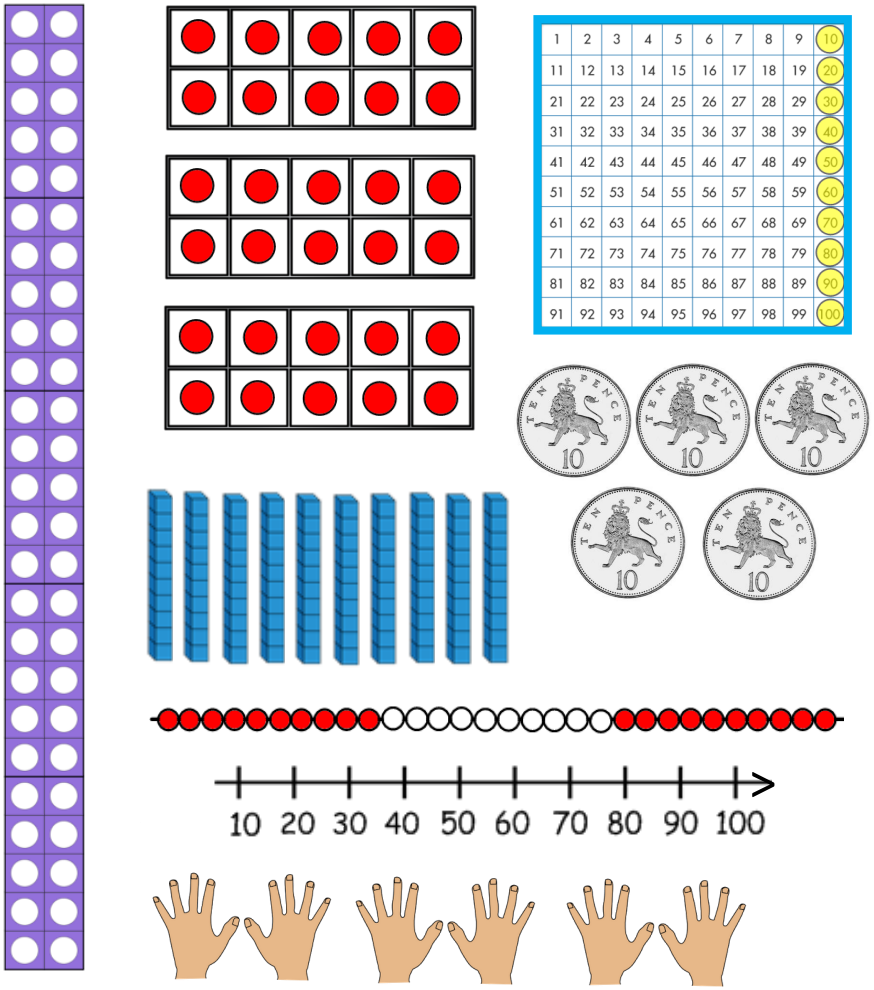






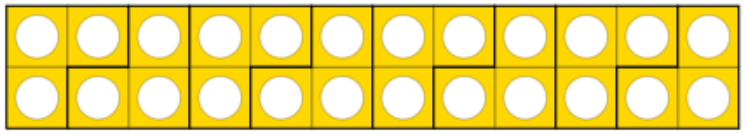
Year 2

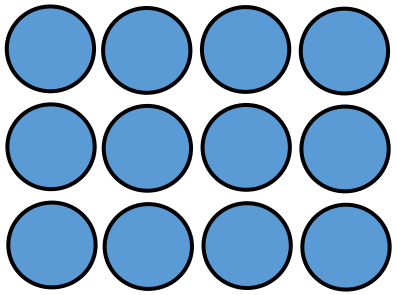
10 Times Table

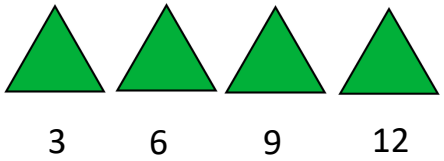


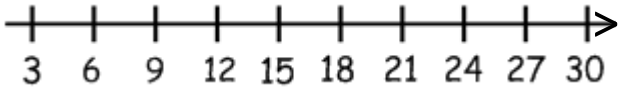
Year 3

3 Times Table



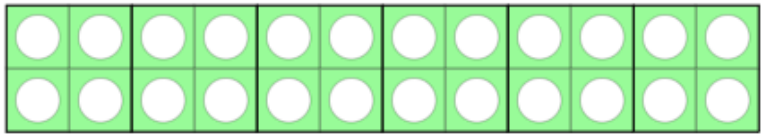




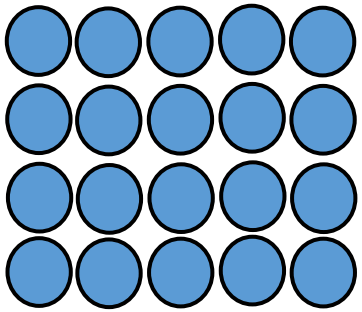


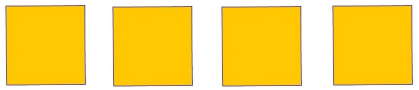
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

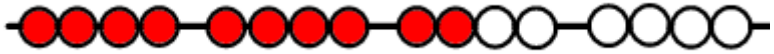
4 times table

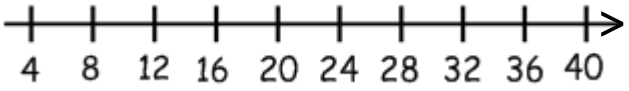


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



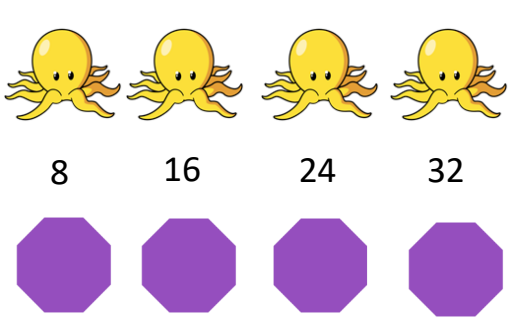






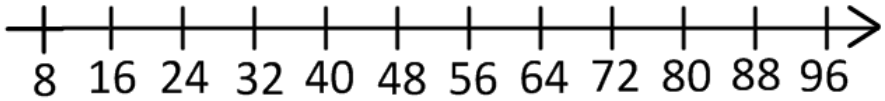
Year 3

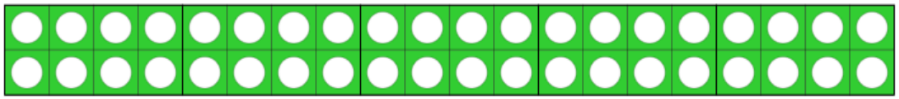
8 Times Table



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

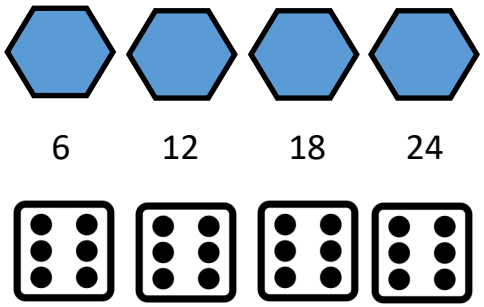
8	16	24	32	40
48	56	64	72	80





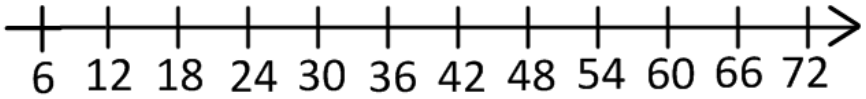
Year 4

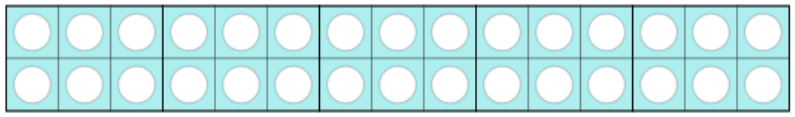
6 Times Table



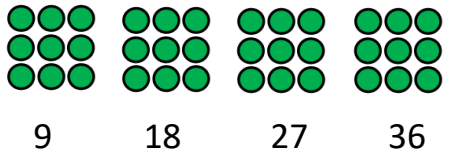
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

6	12	18	24	30
36	42	48	54	60



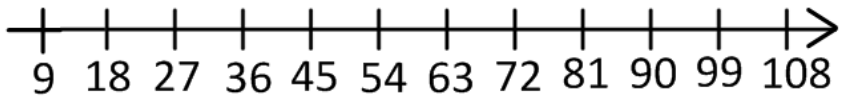


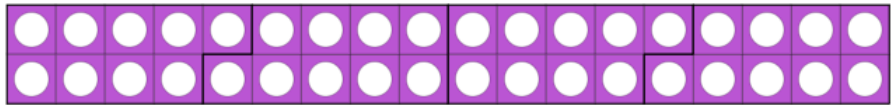
9 times table



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

9	18	27	36	45
54	63	72	81	90





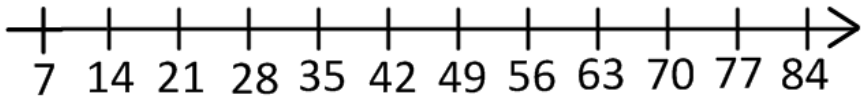
Year 4

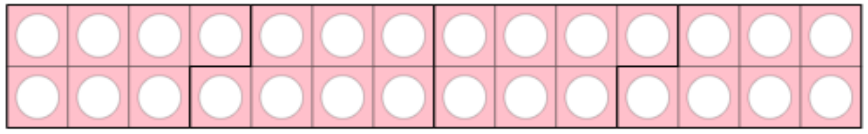
7 Times Table

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

	SUN	MON	TUE	WED	THU	FRI	SAT
7 days							
14 days							
21 days							
28 days							

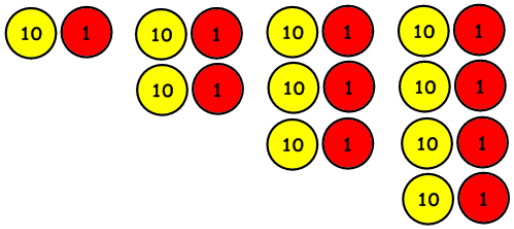
7	14	21	28	35
42	49	56	63	70



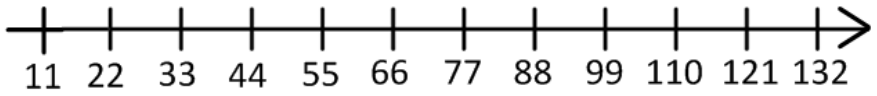


11 times table

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

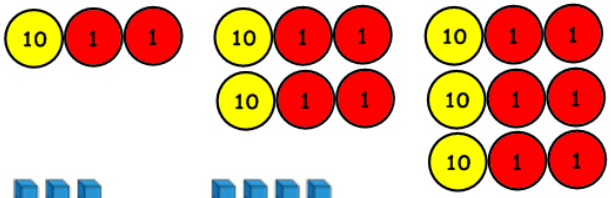


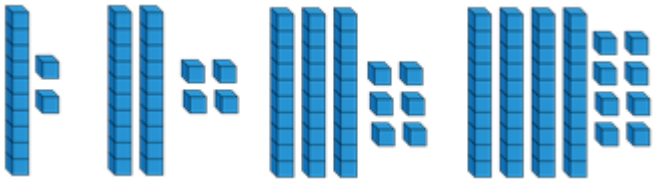
11	22	33	44	55	66
77	88	99	110	121	132



Year 4

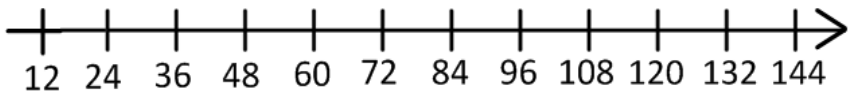
12 Times Table





12	24	36	48	60
72	84	96	108	120
132	144			

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



Multiplication

Progression through representation in Multiplication

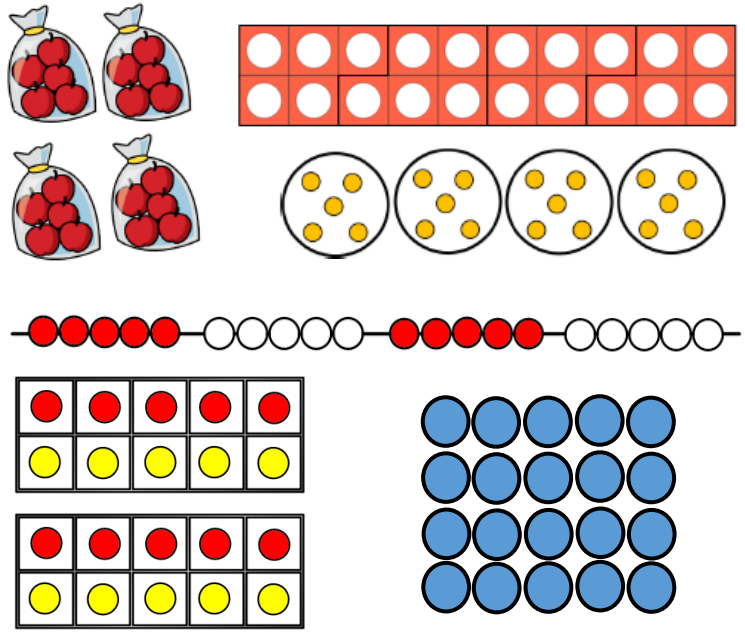
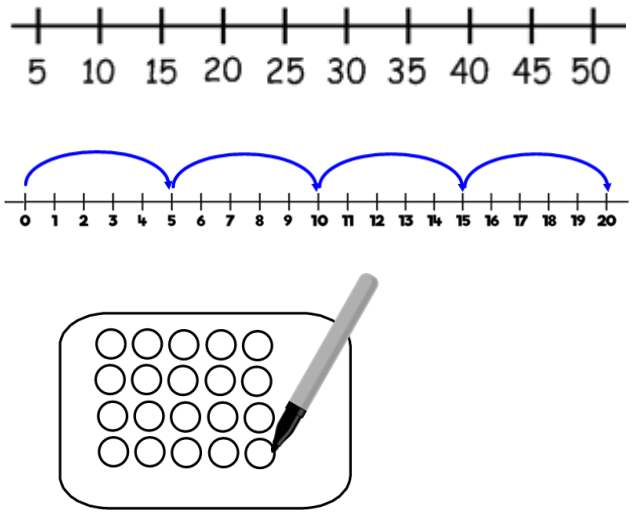
Skill	Year	Representations and Models	
Solve problems involving doubling	EYFS	Fingers Objects in the every-day environment (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Solve one-step problems with multiplication	1/2	Bar model Number shapes (Numicon) Counters	Ten frames Bead strings Number lines
Multiply 2-digit by 1-digit numbers	3/4	Place value counters Base 10	Short written method Expanded written method
Multiply 3-digit by 1-digit numbers	4	Place value counters Base 10	Short written method

Skill	Year	Representations and Models	
Multiply 4-digit by 1-digit numbers	5	Place value counters	Short written method
Multiply 2-digit by 2-digit numbers	5	Place value counters Base 10	Short written method Grid method
Multiply 2-digit by 3-digit numbers	5	Place value counters	Short written method Grid method
Multiply 2-digit by 4-digit numbers	5/6	Formal written method	

Year 1 and 2

Skill: Solve 1-step problems using multiplication

Big Idea: Children represent multiplication as repeated addition in many different ways. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally. In Year 2, children are introduced to the multiplication symbol.

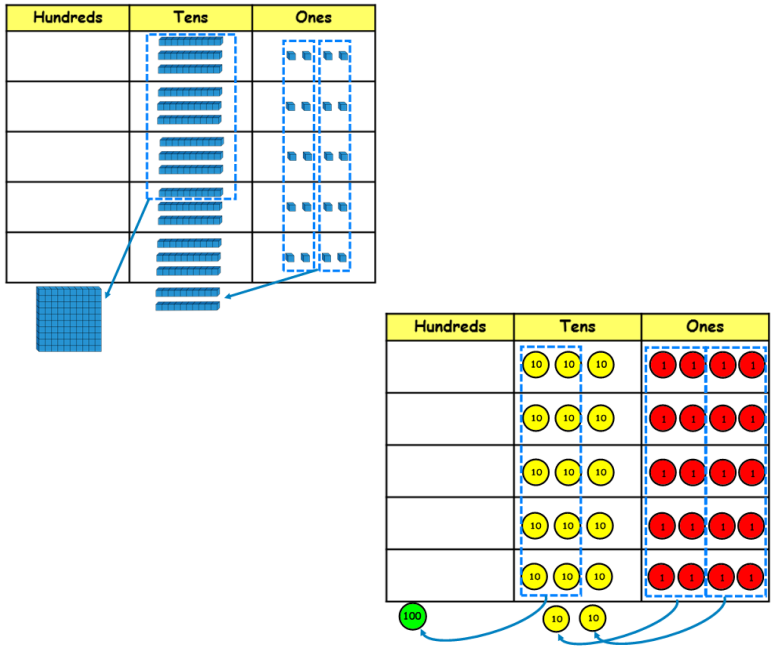
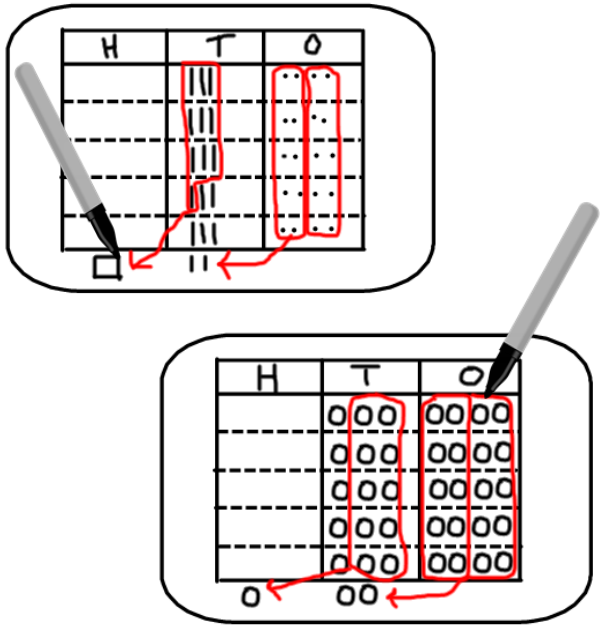
Concrete	Pictorial	Abstract
		One bag holds 5 apples. How many apples do 4 bags hold? 4 × 5 = 20 4×5=20 5 + 5 + 5 + 5 = 20 4 × 5 = 20 5 × 4 = 20

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition.

Year 3 and 4

Skill: Multiply 2-digit numbers by a 1-digit number

Big Idea: Teachers may decode to first look at the expanded column method before moving on to the short multiplication method. The place value counters should be used to support the understanding of the method rather than the multiplication, as children should use times table knowledge.

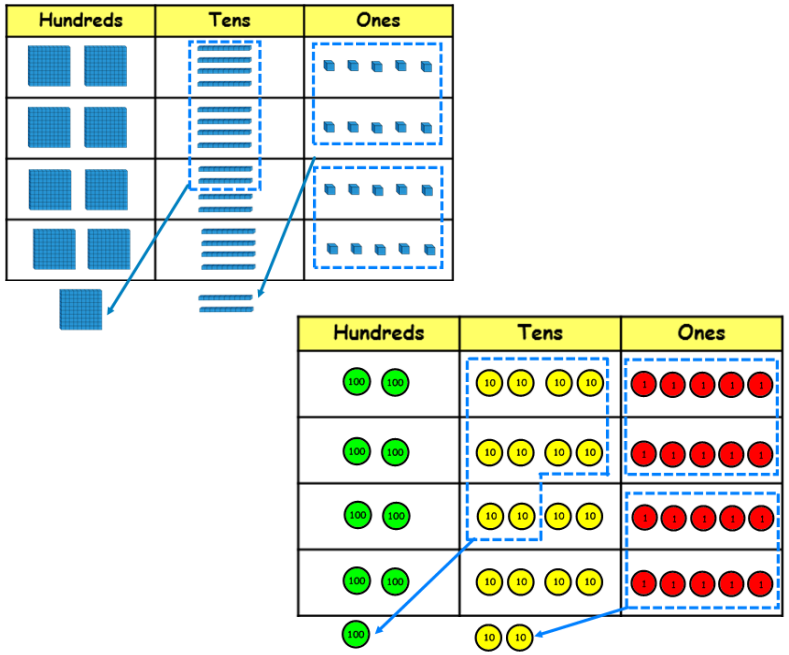
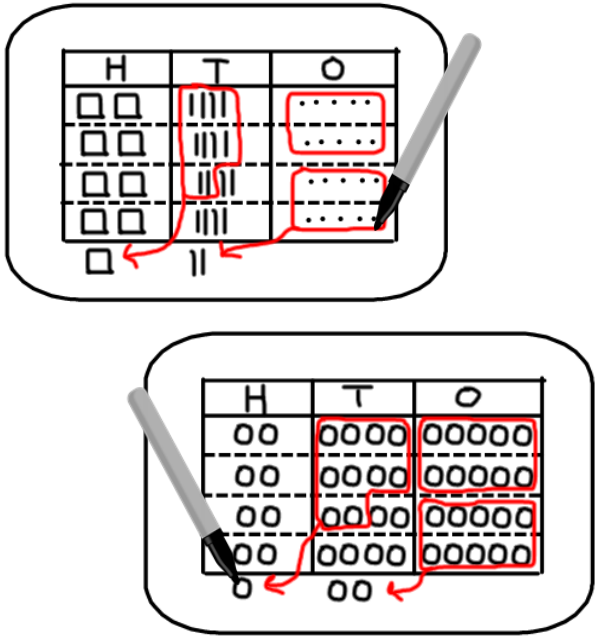
Concrete	Pictorial	Abstract
		34 x 5 = 170 H T O 3 4 x 5 2 0 (5 x 4) + 1 5 0 (5 x 30) 1 7 0 H T O 3 4 x 5 1 7 0 1 2

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition.

Year 3 and 4

Skill: Multiply 3-digit number by a 1-digit number

Big Idea: When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short, formal written method. Base 10 and place value counters continue to support the understanding of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.

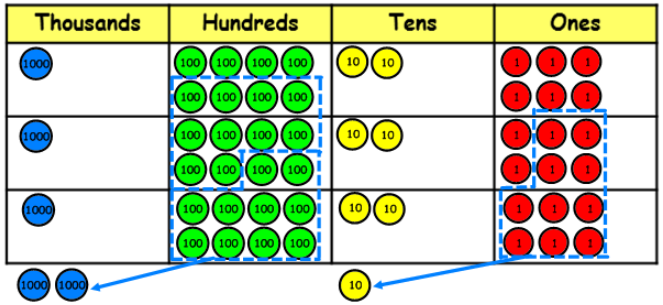
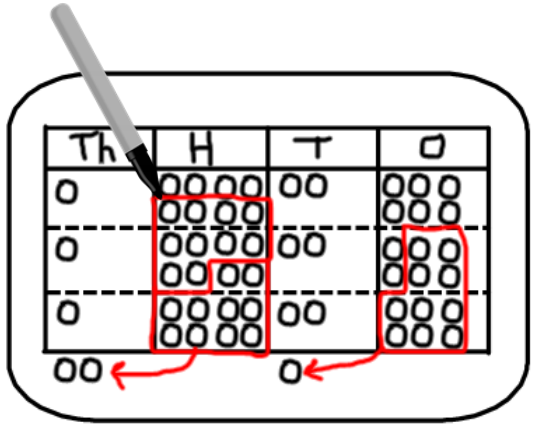
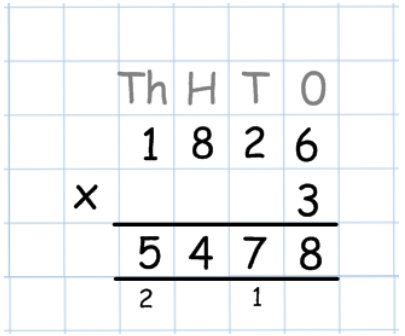
Concrete	Pictorial	Abstract
		245 x 4 = 980 H T O 2 4 5 x 4 9 8 0 1 2

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition, exchange, factor, product, remainder

Year 5

Skill: Multiply 4-digit number by a 1-digit number

Big Idea: When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.

Concrete	Pictorial	Abstract
		1,826 x 3 = 5,478 

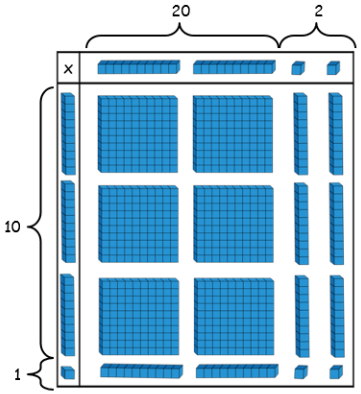
Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition, exchange, factor, product, remainder, squared, cubed

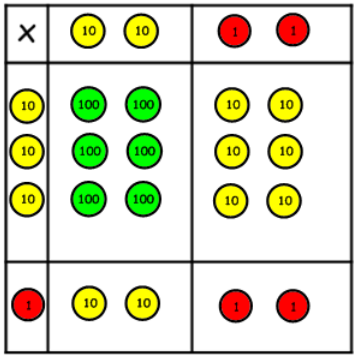
Year 5

Skill: Multiply a 2-digit number by a 2-digit number

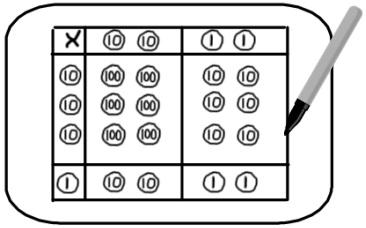
Big Idea: When multiplying a multi-digit numbers by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangles by finding the space covered by the Base 10. the grid method matches the area model as an initial written method before moving on to the formal written multiplication.

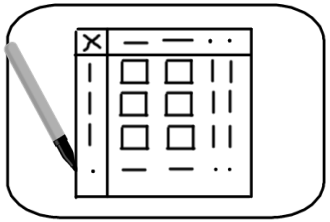
Concrete





Pictorial





×	20	2
30	600	60
1	20	2

Abstract

22 × 31 = 682

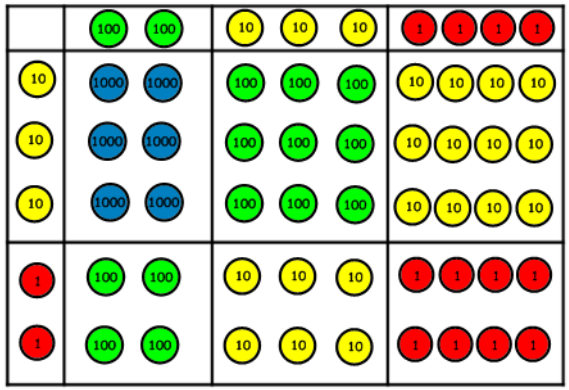
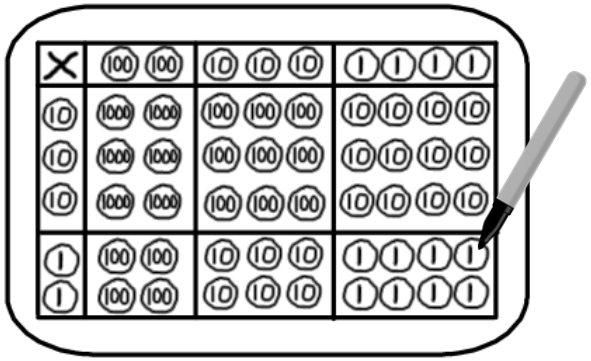
	H	T	O	
		2	2	
×		3	1	
		2	2	(22 × 1)
+	6	6	0	(22 × 30)
	6	8	2	

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition, exchange, factor, product, remainder, squared, cubed

Year 5

Skill: Multiply a 3-digit number by a 2-digit number

Big Idea: Children can continue to use the area model when multiplying 3-digits by 2-digits. Place value counters become more efficient to use but base 10 can be used to highlight the size of numbers. Encourage children to move towards the formal written method, seeing the links with the grid method.

Concrete	Pictorial	Abstract
		234 x 32 = 7,488

x	200	30	4
30	6000	900	120
2	400	60	8

	Th	H	T	O
		2	3	4
x			3	2
		4	6	8
+	1	7	1	0 2 0
		7	4	8 8

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition, exchange, factor, product, remainder, squared, cubed

Year 5 and 6

Skill: Multiply a 4-digit number by a 2-digit number

Big Idea: When multiplying 4-digits by 2-digits, children should be confident in the written method. If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method. Consider where exchanged digits are placed and make sure this is consistent.

Abstract

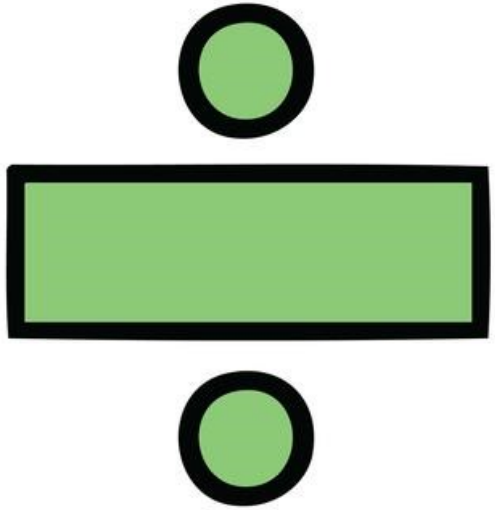
2,739 × 29 = 76,692

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

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

Vocabulary: multiplication, multiply, multiplied by, multiple, 'lots of', 'groups of', doubling, array, number patterns, repeated addition, exchange, factor, product, remainder, squared, cubed

Division



Progression through representation in Division

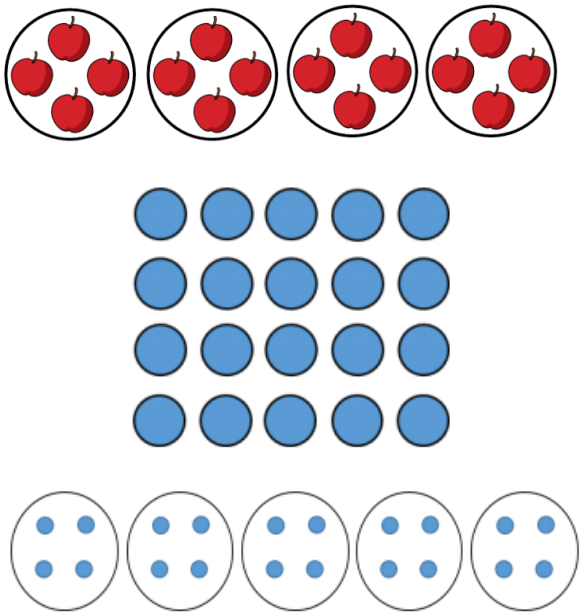
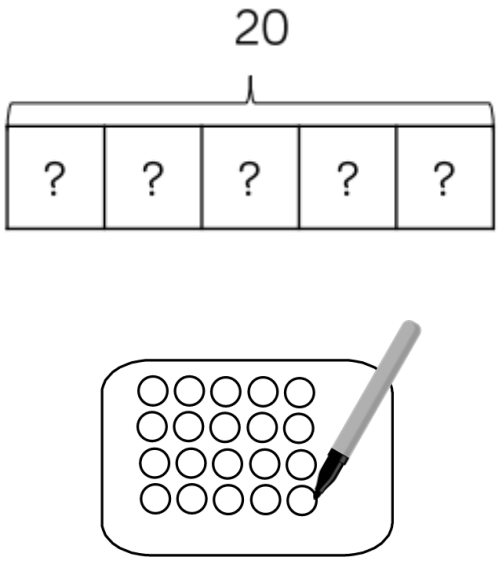
Skill	Year	Representations and Models	
Solve problems involving halving and sharing	EYFS	Real life objects (natural and man-made)	Numerblocks (BBC) Number shapes (Numicon) Tens frames + counters (within 10)
Solve one-step problems with division (sharing)	1/2	Real life objects Bar model	Arrays Counters
Solve one-step problems with division (grouping)	1/2	Real life objects Number shapes (Numicon) Bead strings Ten frames	Number lines Arrays Counters
Divide 2-digits by 1-digit (no exchange sharing)	3	Straws Base 10 Bar model	Place value counters Part-whole model
Divide 2-digits by 1-digit (sharing with exchange)	3	Straws Base 10 Bar model	Place value counters Part-whole model

Skill	Year	Representations and Models	
Divide 2-digits by 1-digit (sharing with reminders)	2/4	Straws Base 10 Bar model	Place value counters Part-whole model
Divide 2-digits by 1-digit (grouping)	4/5	Place value counters Counters	Place value grid Written short division
Divide 3-digits by 1-digit (sharing with exchange)	4	Base 10 Bar model	Place value counters Part-whole model
Divide 3-digits by 1-digit (grouping)	4/5	Place value counters Counters	Place value grid Written short division

Year 1 and 2

Skill: Solve 1-step problems using division (sharing)

Big Idea: Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. In Year 2, children are introduced to the division symbol.

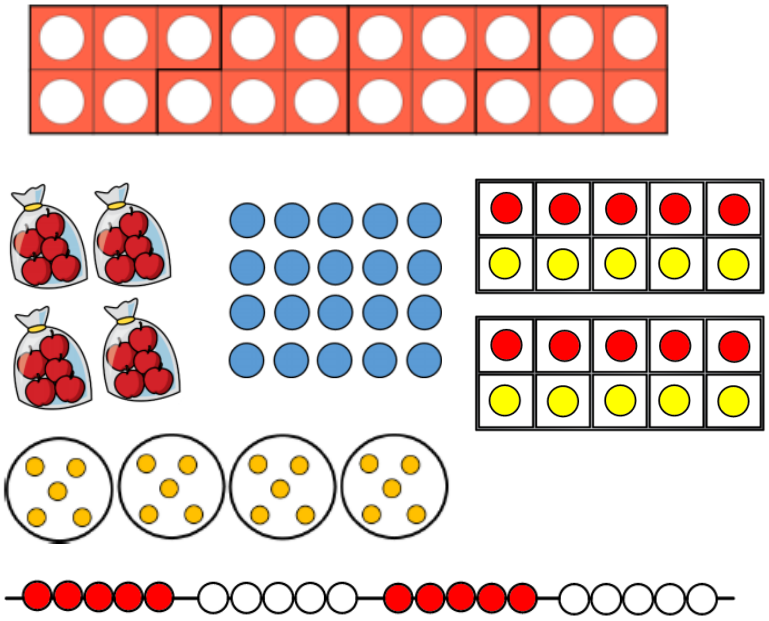
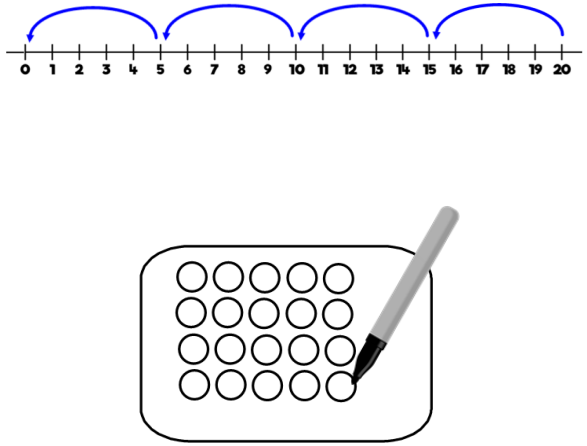
Concrete	Pictorial	Abstract
		20 ÷ 4 = 5 20÷4=5 2 0 ÷ 4 = 5 There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each

Vocabulary: division, dividing, divided by, divided into, sharing, shared equally, shared by, shared into, halving, array.

Year 1 and 2

Skill: Solve 1-step problems using division (grouping)

Big Idea: Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes, which helps to show the link between multiplication and division.

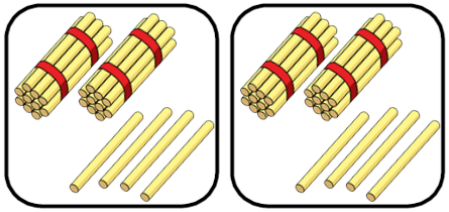
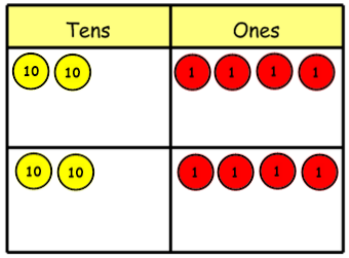
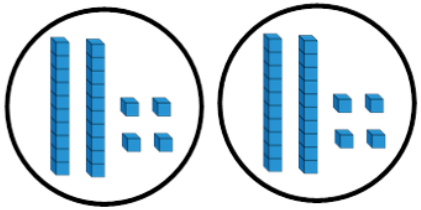
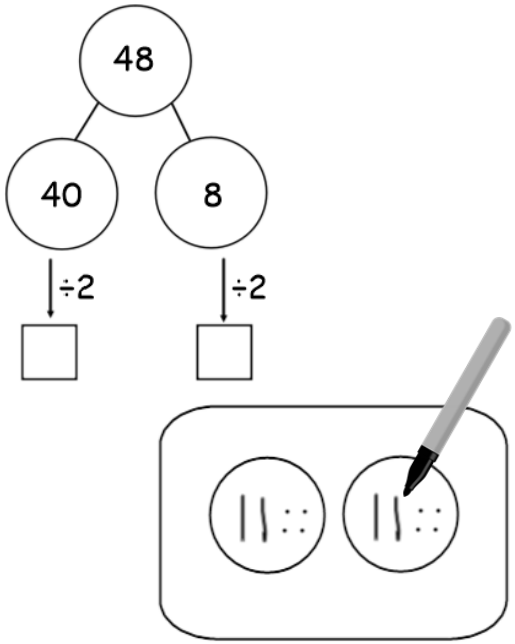
Concrete	Pictorial	Abstract
		20 ÷ 4 = 5 20÷4=5 2 0 ÷ 4 = 5 There are 20 apples altogether. They are put in bags of 5. How many bags are there?

Vocabulary: division, dividing, divided by, divided into, grouping, halving, array.

Year 1 and 2

Skill: Divide 2-digits by 1-digit (sharing with no exchange)

Big Idea: When dividing larger numbers, children can use manipulatives that allow them to partition tens and ones. Straws, Base 10 and place value counters can all be used to share numbers into equal groups. Part-whole models can provide children with a clear written method that matches the concrete representation.

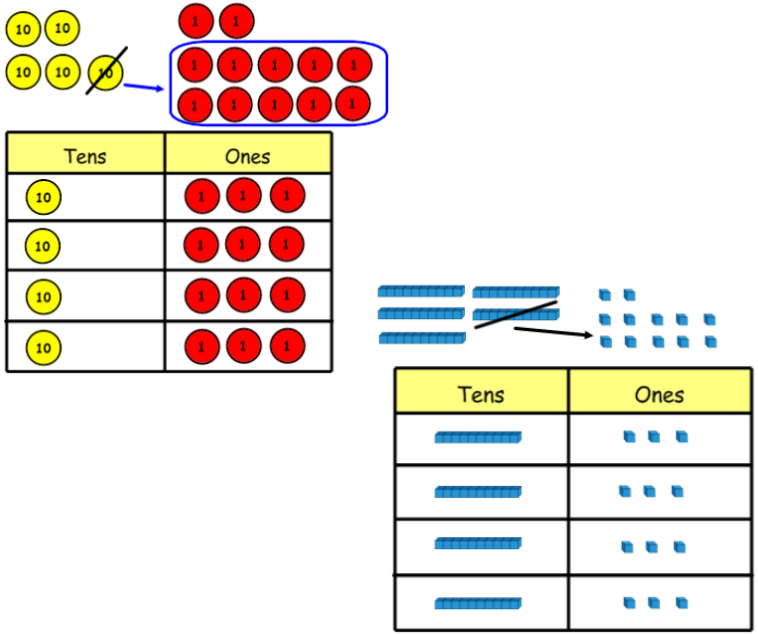
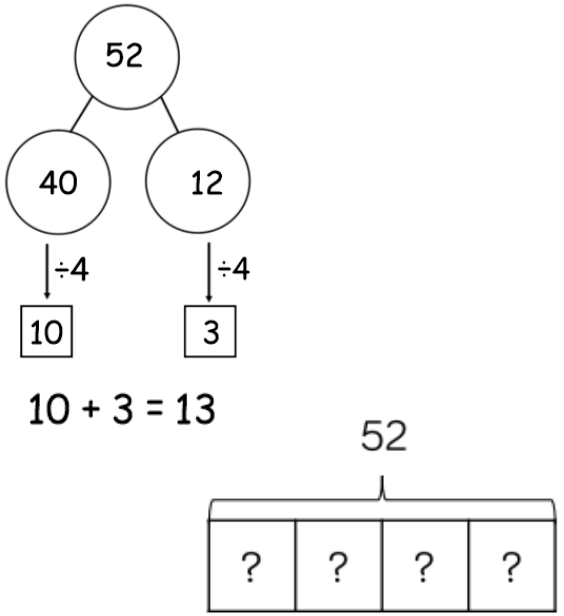
Concrete	Pictorial	Abstract
  		4 8 ÷ 2 = 4 8

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array.

Year 3 and 4

Skill: Divide 2-digits by 1-digit (sharing with exchange)

Big Idea: When dividing numbers involving an exchange, children can use Base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows. Flexible partitioning in a part-whole model supports this method.

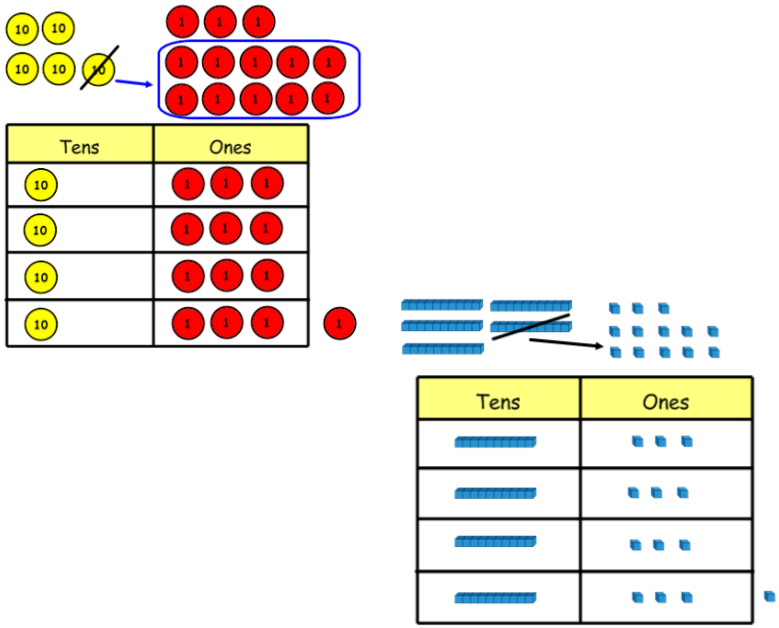
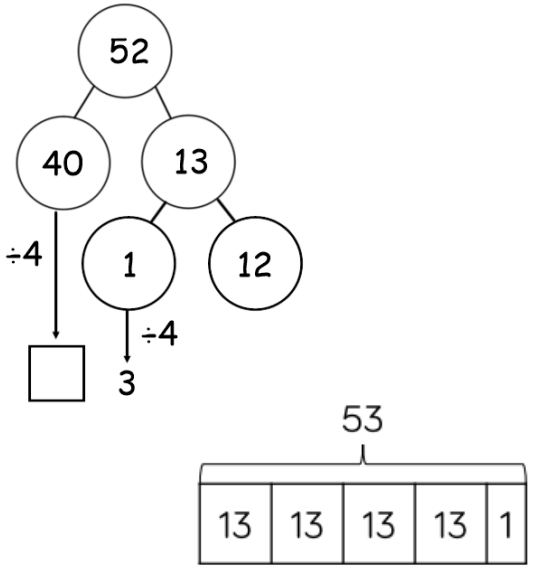
Concrete	Pictorial	Abstract
		5 2 ÷ 4 = 1 3

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange

Year 3 and 4

Skill: Divide 2-digits by 1-digit (sharing with reminders)

Big Idea: When dividing numbers with reminders, children can use Base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made. Flexible partitioning in a part-whole model supports this method.

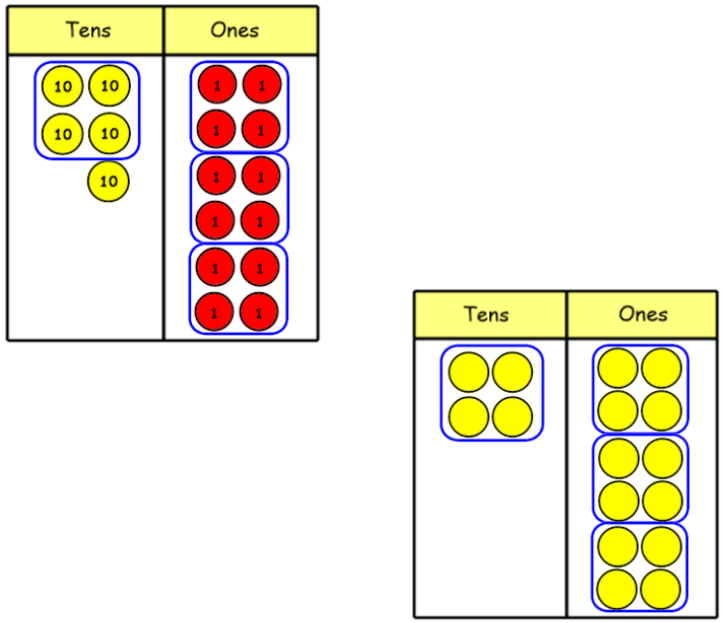
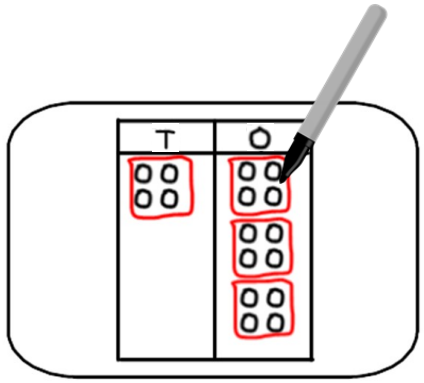
Concrete	Pictorial	Abstract
		5 3 ÷ 4 = 1 3 r 1

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 4 and 5

Skill: Divide 2-digits by 1-digit (grouping)

Big Idea: When using the short division method, children use grouping. Starting with the largest place value, they group by the divisor. Language is important here . Children should consider 'how many groups of 4 tens can we make?' and 'How many groups of 4 ones we make?'. Remainders an also be seen as they are left ungrouped.

Concrete	Pictorial	Abstract
		1 3 r 1 4 ⟌ 5 2 5 2 ÷ 4 = 1 3 r 1

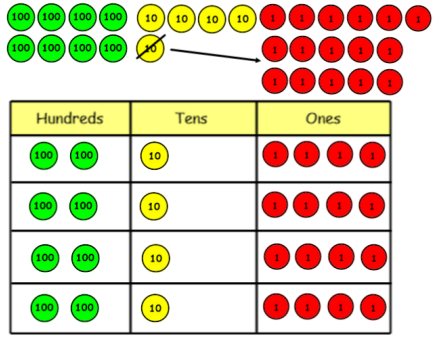
Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 4

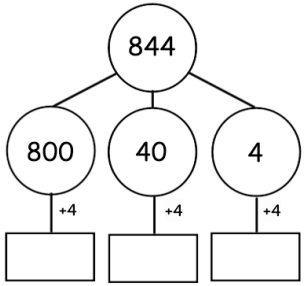
Skill: Divide 3-digits by 1-digit (sharing)

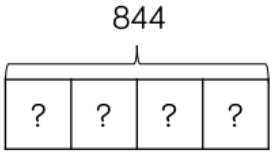
Big Idea: Children can continue to use place value counters to share 3-digit numbers into equal groups. Children should start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. This method can also help to highlight reminders. Flexible partitioning in a part-whole model supports this method.

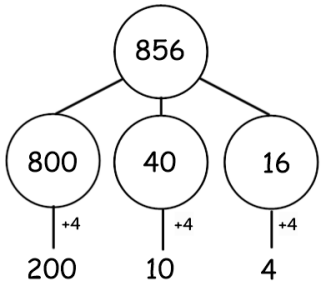
Concrete



Pictorial







Abstract

8 4 4 ÷ 4 = 2 1 1

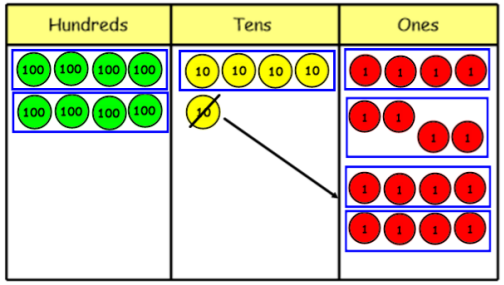
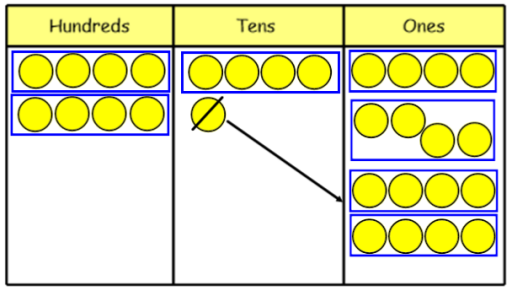
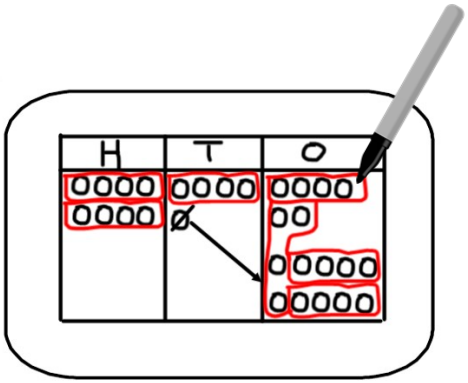
8 5 6 ÷ 4 = 2 1 4

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 5

Skill: Divide 3-digits by 1-digit (grouping)

Big Idea: Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number. Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and groups them through a more pictorial method.

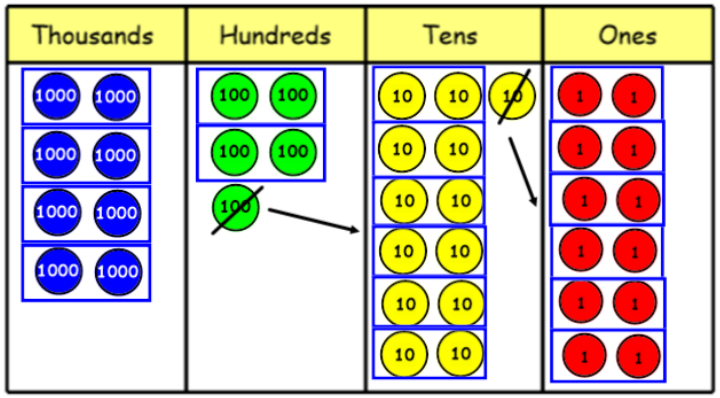
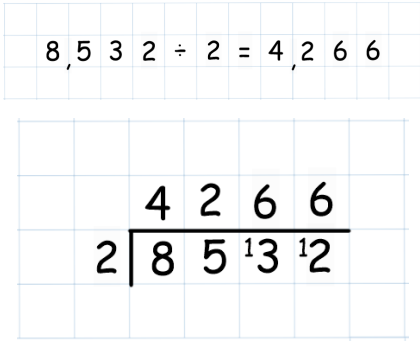
Concrete	Pictorial	Abstract
 		$\begin{array}{r} 214 \\ 4\overline{)856} \end{array}$ 856 ÷ 4 = 214

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 5

Skill: Divide 4-digits by 1-digit (grouping)

Big Idea: Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit. Children can also draw their own counters and group them through a more pictorial method. Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.

Concrete	Pictorial	Abstract
		

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 6

Skill: Divide multi-digits by 2-digits (short division)

Big Idea: When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete a pictorial representations become less effective. Children can write out multiples to support their calculations with larger reminders. Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Concrete	Pictorial	Abstract

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder

Year 6

Skill: Divide multi-digits by 2-digits (long division)

Big Idea: Children can also divide by 2-digit numbers using long division. Children can write out multiples to support their calculations with larger remainders. Children will also solve problems with remainders where the quotient can be rounded as appropriate.

Concrete	Pictorial	Abstract

Vocabulary: division, dividing, divided by, divided into, grouping, sharing, shared equally, shared by, shared into, halving, array, exchange, remainder