

Upperwood Calculation Policy 2023

Addition & Subtraction



This document gives an overview of the different models, visuals and operations used to teach addition and subtraction at Upperwood Academy. This policy forms the basis of how we adapt and teach the White Rose Maths scheme of learning.

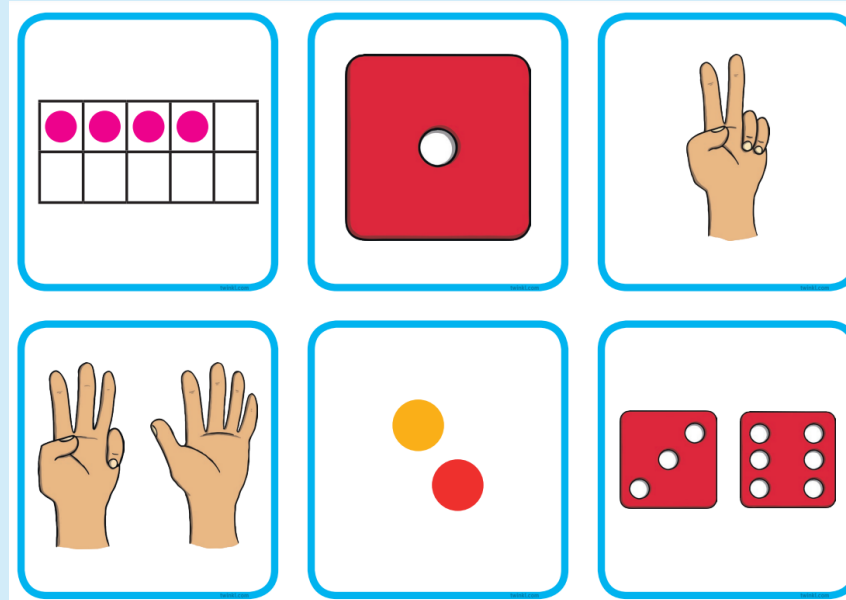


Progression of Addition Skills	Year	Representations & Models	
Subitise (recognise quantities without counting) up to 5	EYFS	Range of objects to count Counting left to right, right to left etc. Arrays	
Automatically recall number bonds up to 5 and some number bonds to 10, including double facts.	EYFS	Ten frames Number shapes Bead strings (10)	
Add two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Add 1 and 2-digit numbers to 20	1 / 2	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead strings (20) Number tracks Number lines (labelled) Straws
Add three 1-digit numbers	2	Part-whole model Bar model	Ten frames (within 20) Number shapes
Add 1 and 2-digit numbers to 100	2	Part-whole model Bar model Number lines (labelled) Column addition	Number lines (blank) Straws Hundred square
Add two 2-digit numbers to 100	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column addition

Progression of Addition Skills	Year	Representations & Models	
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 & 6	Part-whole model Bar model	Place value counters Column addition
Add with up to 3 decimal places	5 & 6	Part-whole model Bar model	Place value counters Column addition

Skill: Subitise (recognise quantities without counting) up to 5

EYFS



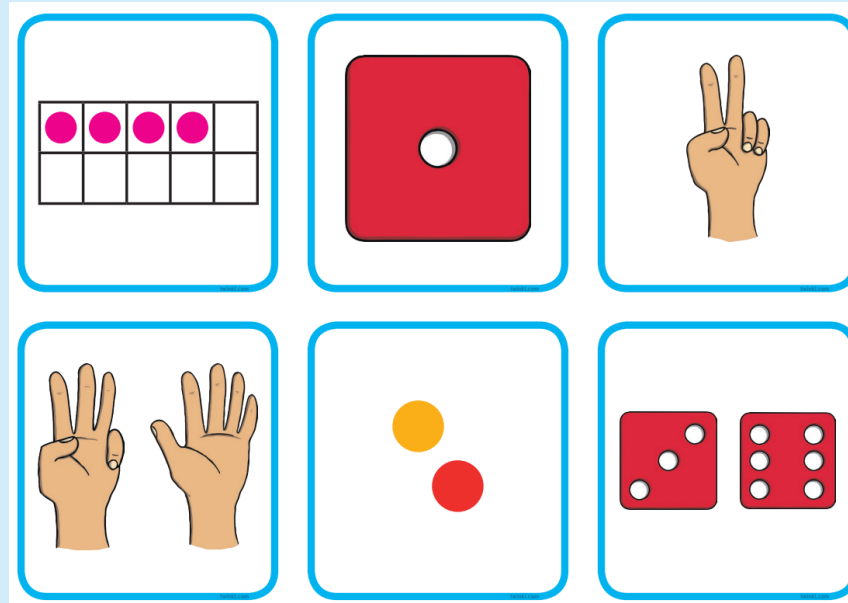
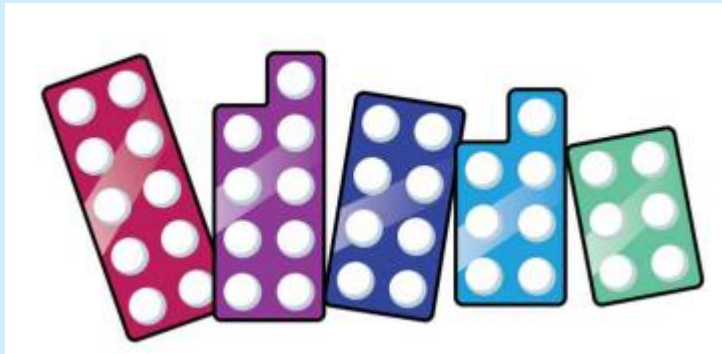
The one-one principle: children assigning one number name to each object that is being counted. Ensuring each object is only counted once.

Understand that a range of objects can be counted as well as things that cannot be touched e.g. jumps, sounds

Children understand that the order we count items is irrelevant. There will still be the same number.

Skill: Automatically recall number bonds up to 5 and some number bonds to 10, including double facts.

EYFS

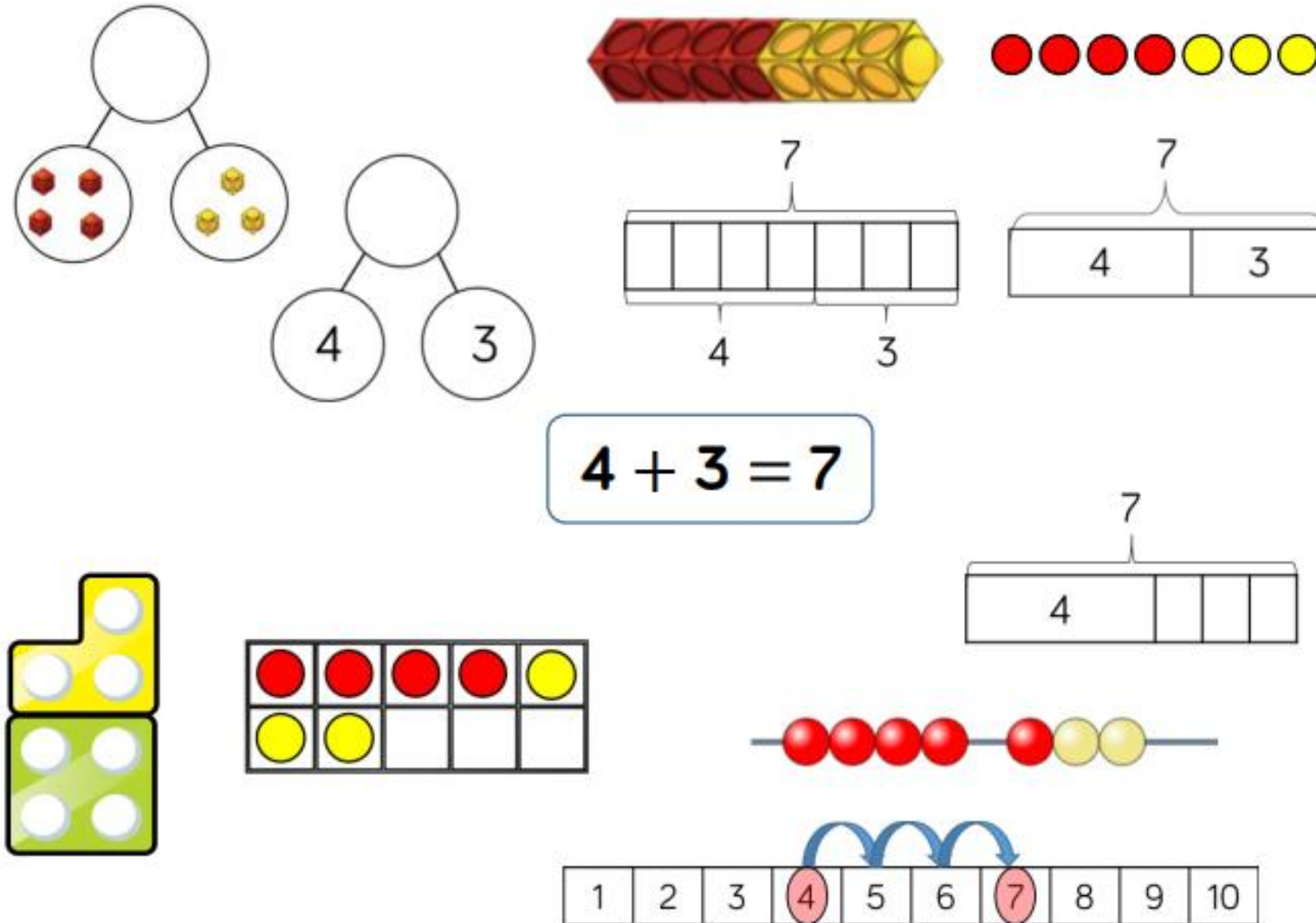


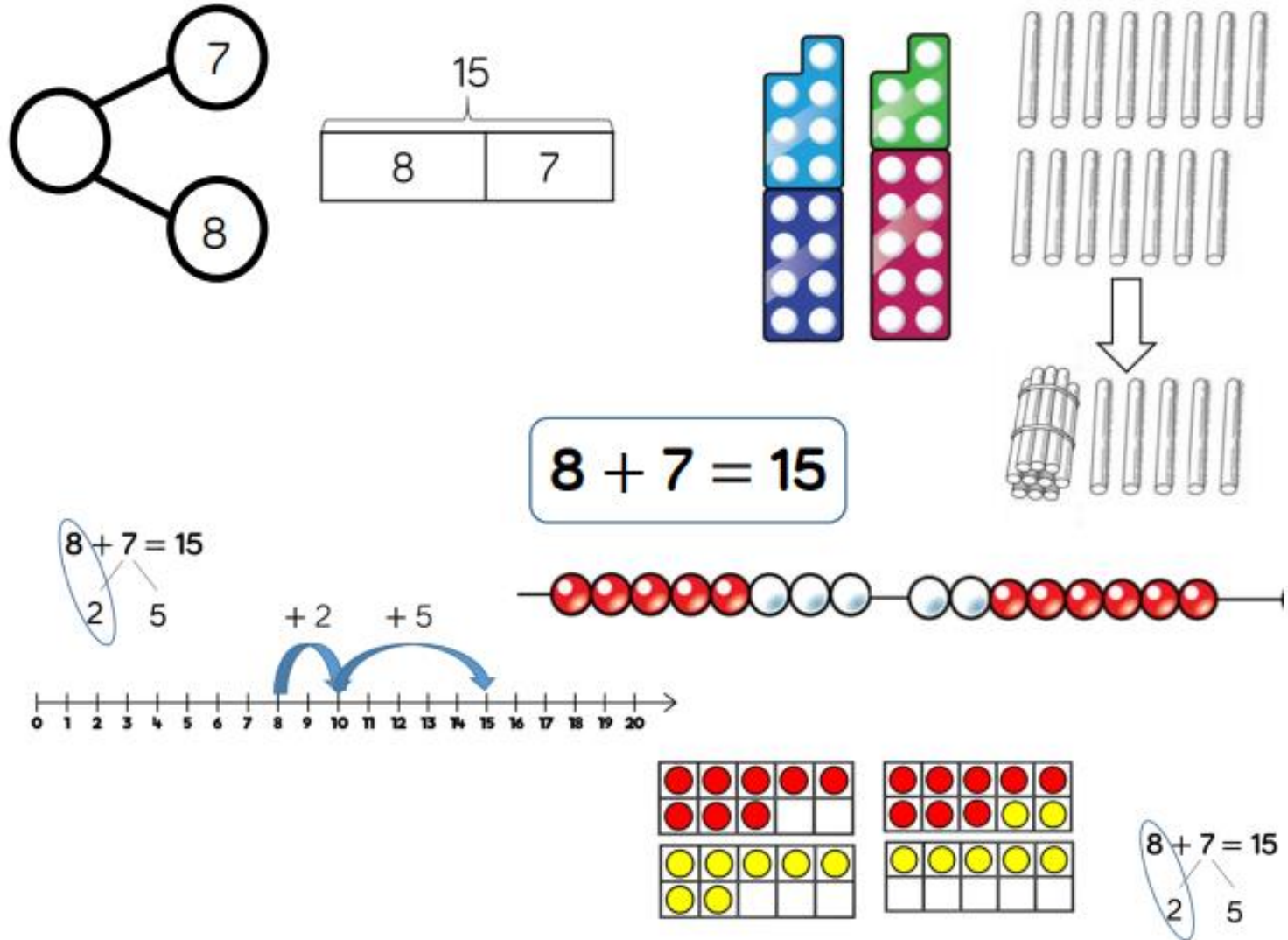
Children need opportunities to explore a range of ways to partition a whole number. The emphasis here is on identifying the pairs of numbers that make a total. Children can do this in two ways - physically separating a group, or constructing a group from two kinds of things.

When adding numbers to 10, children can explore both aggregation and augmentation.

The part-whole model, discrete and continuous bar model, number shapes and ten frame support aggregation.

The combination bar model, ten frame, bead string and number track all support augmentation.

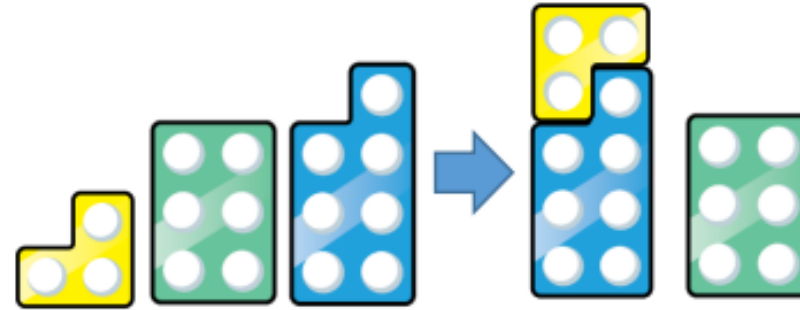
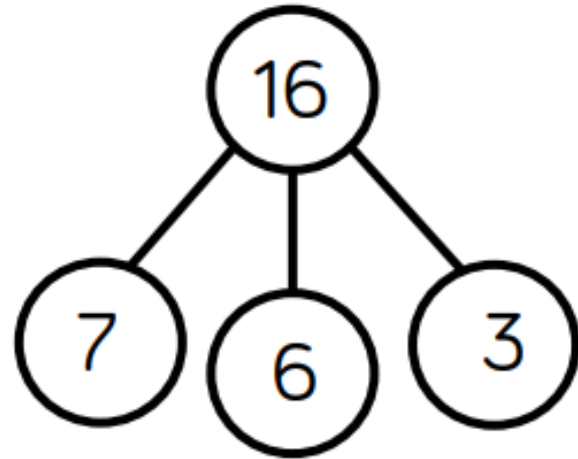




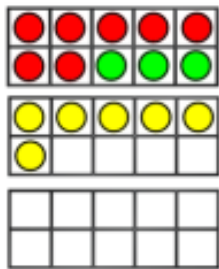
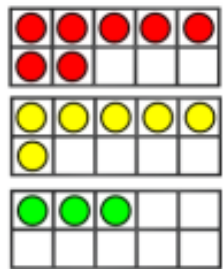
When adding one - digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.

In Year 1, this is only done just by counting on.

From Year 2, use different manipulatives can be used to represent this exchange alongside number lines to support children in understanding how to partition their jumps.

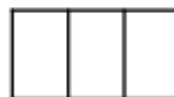
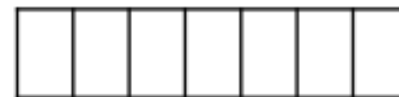


$$7 + 6 + 3 = 16$$



$$7 + 6 + 3 = 16$$

10



16

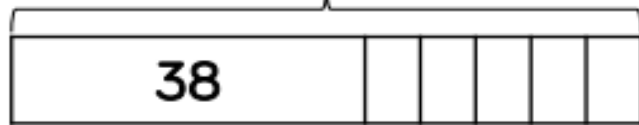
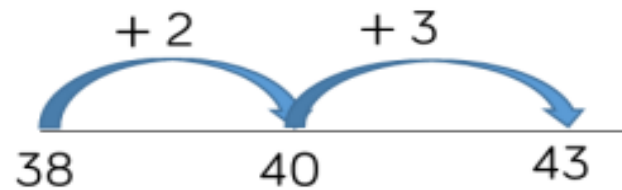
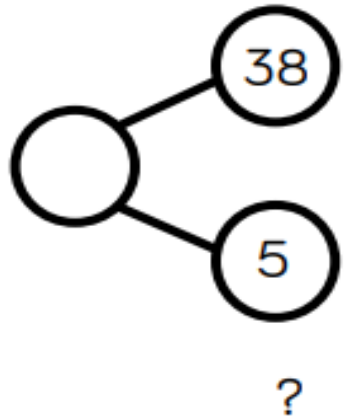
When adding three 1 - digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

This supports children in their understanding of commutativity.

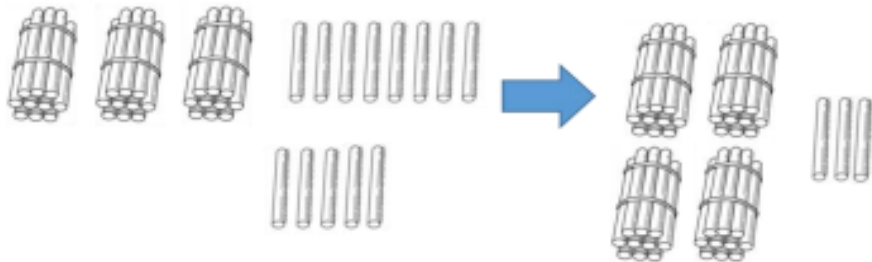
Manipulatives that highlight number bonds to 10 are effective when adding three 1 -digit numbers.

Skill: Add 1 and 2-digit numbers to 100

Year 2



$$38 + 5 = 43$$



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

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 of number bonds to add more efficiently e.g. $8 + 5 = 13$ so $38 + 5 = 43$.

Hundred squares and straws can support children to find the number bond to 10.

From Year 2, 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.

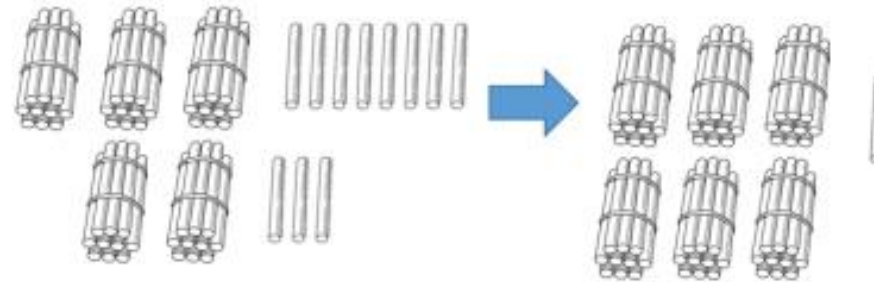
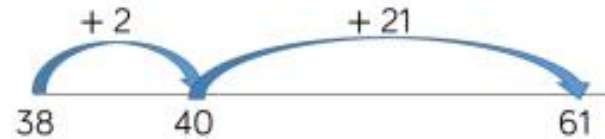
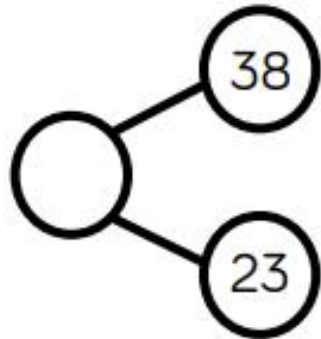
Skill: Add two 2-digit numbers to 100

Year 2

Children can use a blank number line and other representations to count on to find the total.

Encourage them to jump to multiples of 10 to become more efficient.

From Year 2, 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



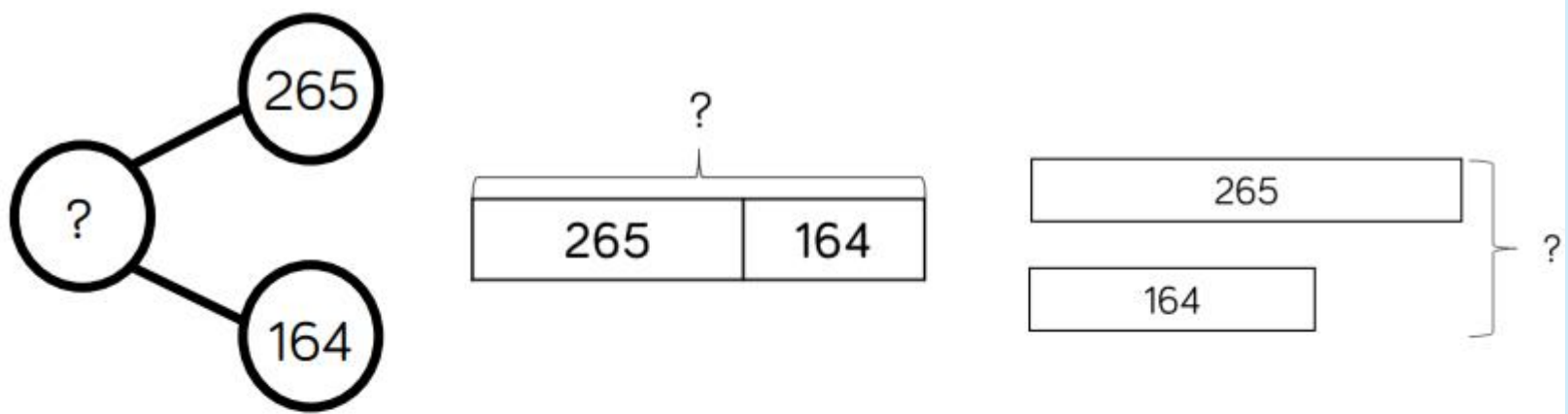
$$38 + 23 = 61$$

?	
38	23

Tens	Ones

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

Tens	Ones

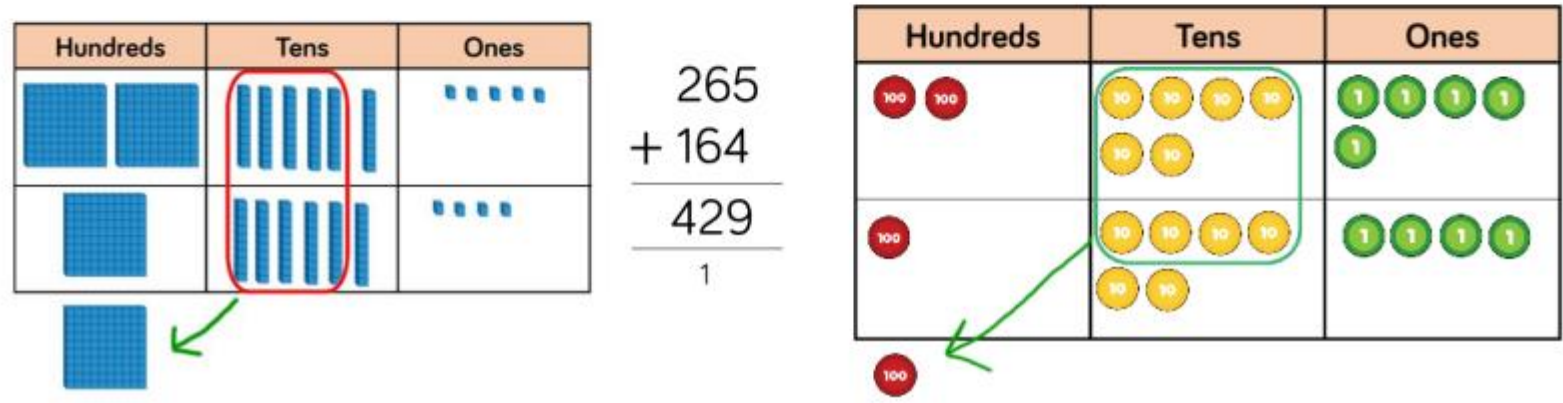


265 + 164 = 429

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 they can see the links to the written column method.

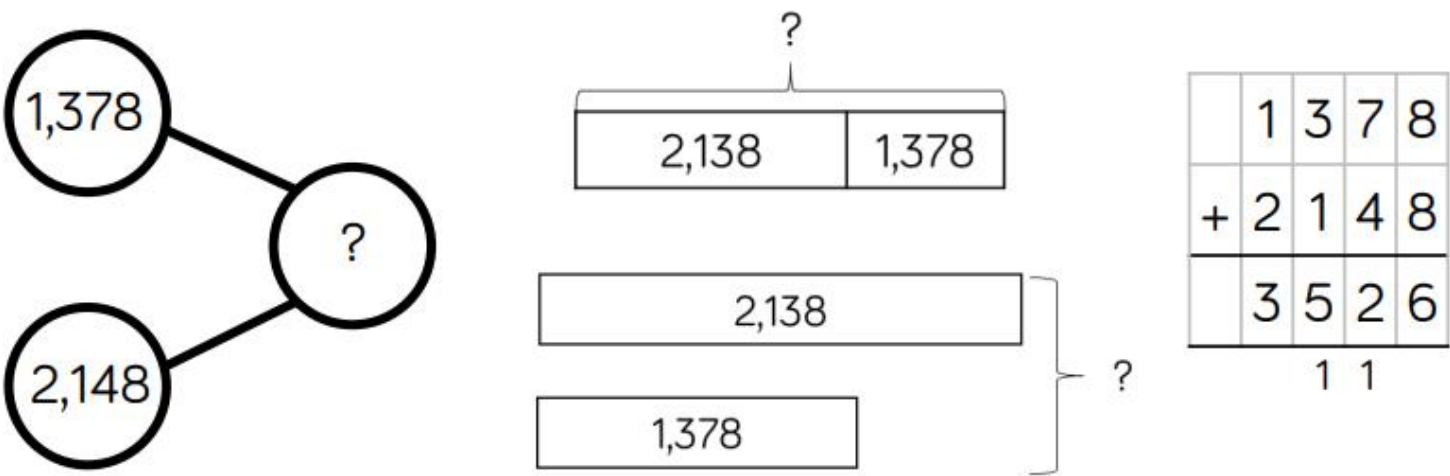
Plain counters on a place value grid can also be used to support learning



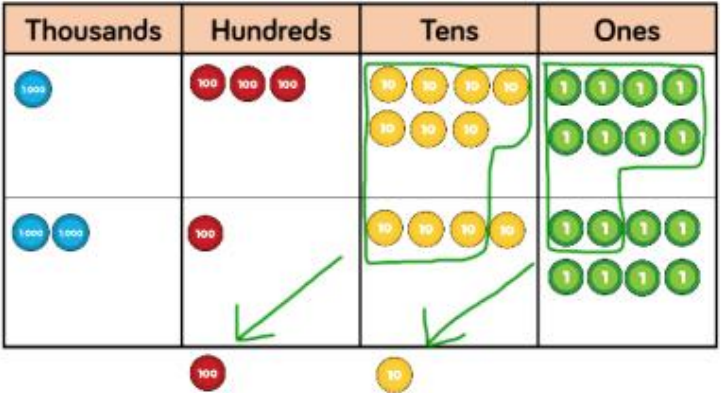
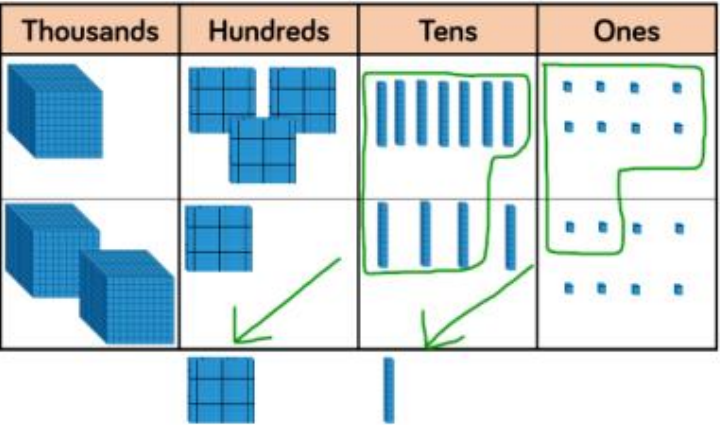
Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 4 digits.

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.



1,378 + 2,148 = 3,526



Place value counters or plain counters on a place value grid are the most effective 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.

?

104,328

61,731

?

104,328

61,731

104,328

61,731

104,328

61,731

104,328

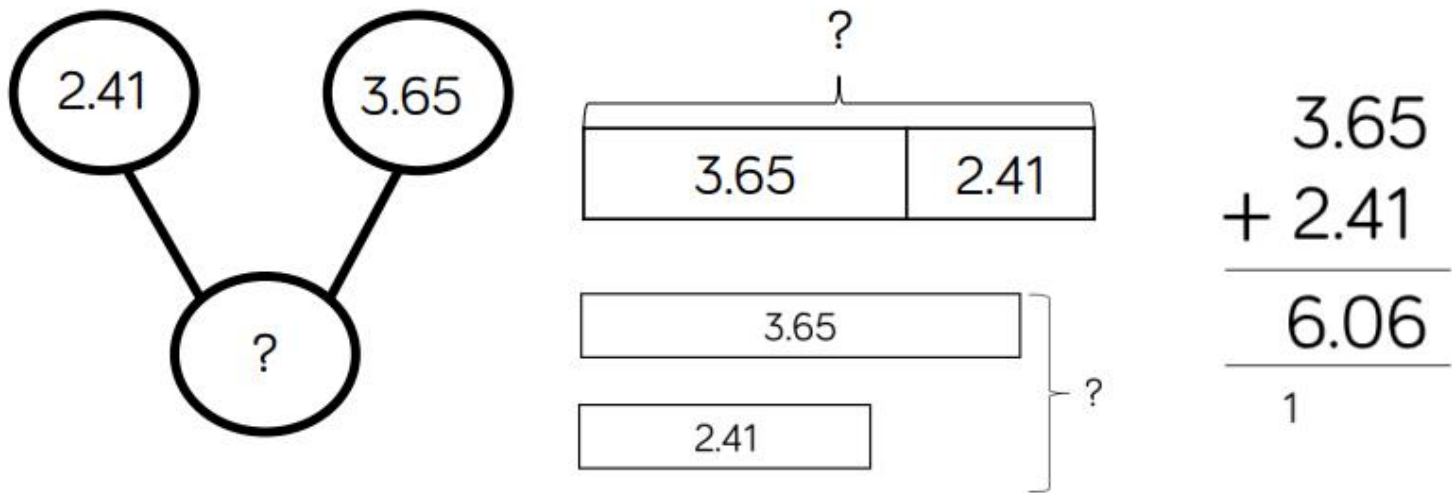
61,731

104,328 + 61,731 = 166,059

HTh	TTh	Th	H	T	O
<div>100000</div>		<div>100010001000</div>	<div>100100100</div>	<div>1010</div>	<div>11111111</div>
	<div>100001000010000</div>	<div>1000</div>	<div>100100100100100</div>	<div>101010</div>	<div>1</div>

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

1



$3.65 + 2.41 = 6.06$

Ones	Tenths	Hundredths
1 1 1	0.1 0.1 0.1 0.1 0.1 0.1	0.01 0.01 0.01 0.01 0.01
1 1	0.1 0.1 0.1 0.1	0.01

1

Ones	Tenths	Hundredths
3	6	6
2	4	1

1

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.

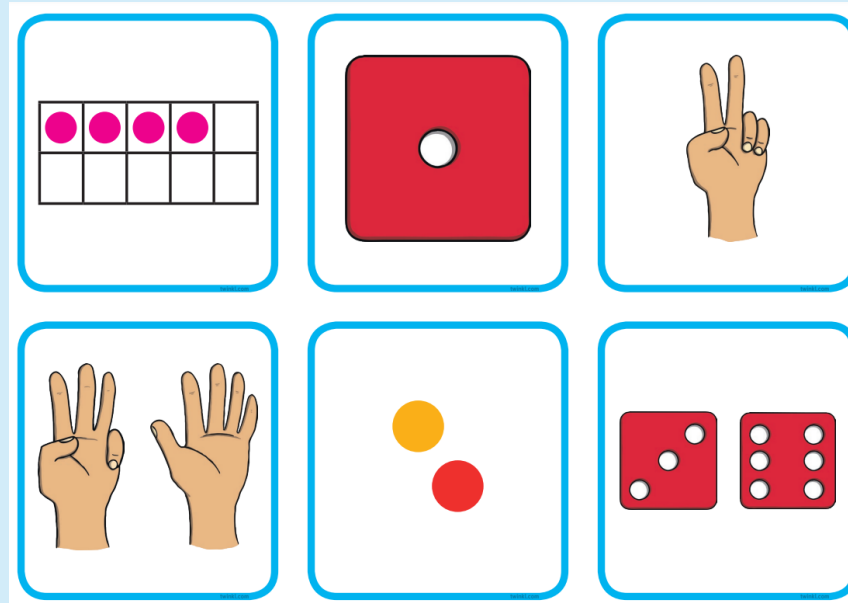
Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures..

Progression of Subtraction Skills	Year	Representations & Models	
Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.	EYFS	Range of objects to count Counting left to right, right to left etc. Arrays Ten frames Bead strings	
Subtract two 1-digit numbers to 10	1	Part-whole model Bar model Number shapes	Ten frames (within 10) Bead strings (10) Number tracks
Subtract 1 and 2-digit numbers to 20	1 / 2	Part-whole model Bar model Number shapes Ten frames (within 20)	Bead string (20) Number tracks Number lines (labelled) Straws
Subtract 1 and 2-digit numbers to 100	2/3	Part-whole model Bar model Number lines (labelled)	Number lines (blank) Straws Column subtraction
Subtract two 2-digit numbers	2	Part-whole model Bar model Number lines (blank) Straws	Base 10 Place value counters Column subtraction

Progression of Subtraction Skills	Year	Representations & Models	
Subtract with up to 3- digits	3	Part-whole model Bar model Base 10	Place value counters Column subtraction
Subtract with up to 4- digits	4	Part-whole model Bar model Base 10	Place value counters Column subtraction
Subtract with more than 4 digits	5 & 6	Part-whole model Bar model	Place value counters Column subtraction
Subtract with up to 3 decimal places	5 & 6	Part-whole model Bar model	Place value counters Column subtraction

Skill: Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.

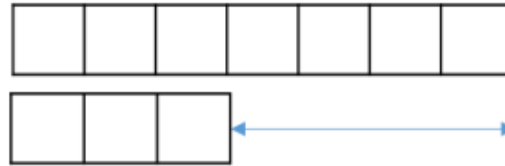
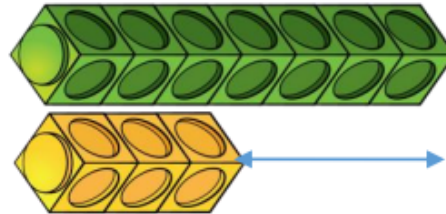
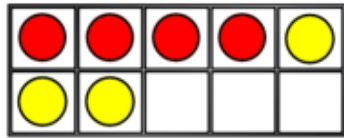
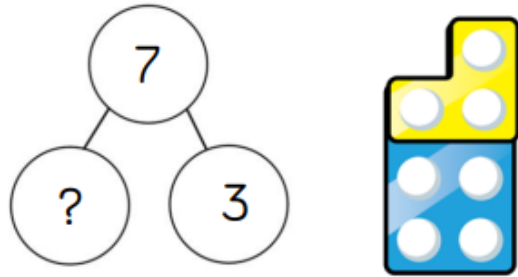
EYFS



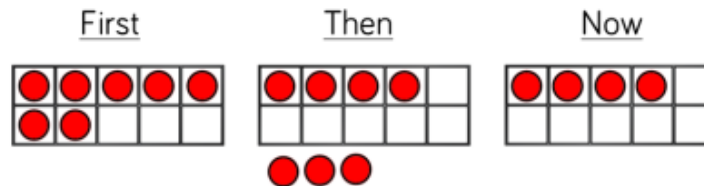
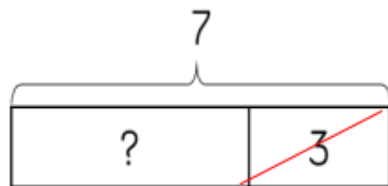
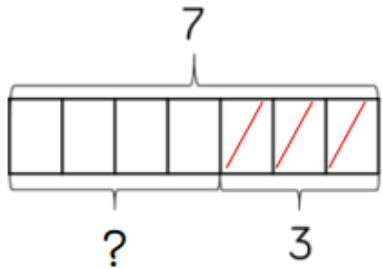
Continue to provide regular opportunities for children to instantly recognise small quantities.

Dice, domino, matching and bingo games to support subitising skills.

Provide regular opportunities for the children to practise counting on and back within 10.



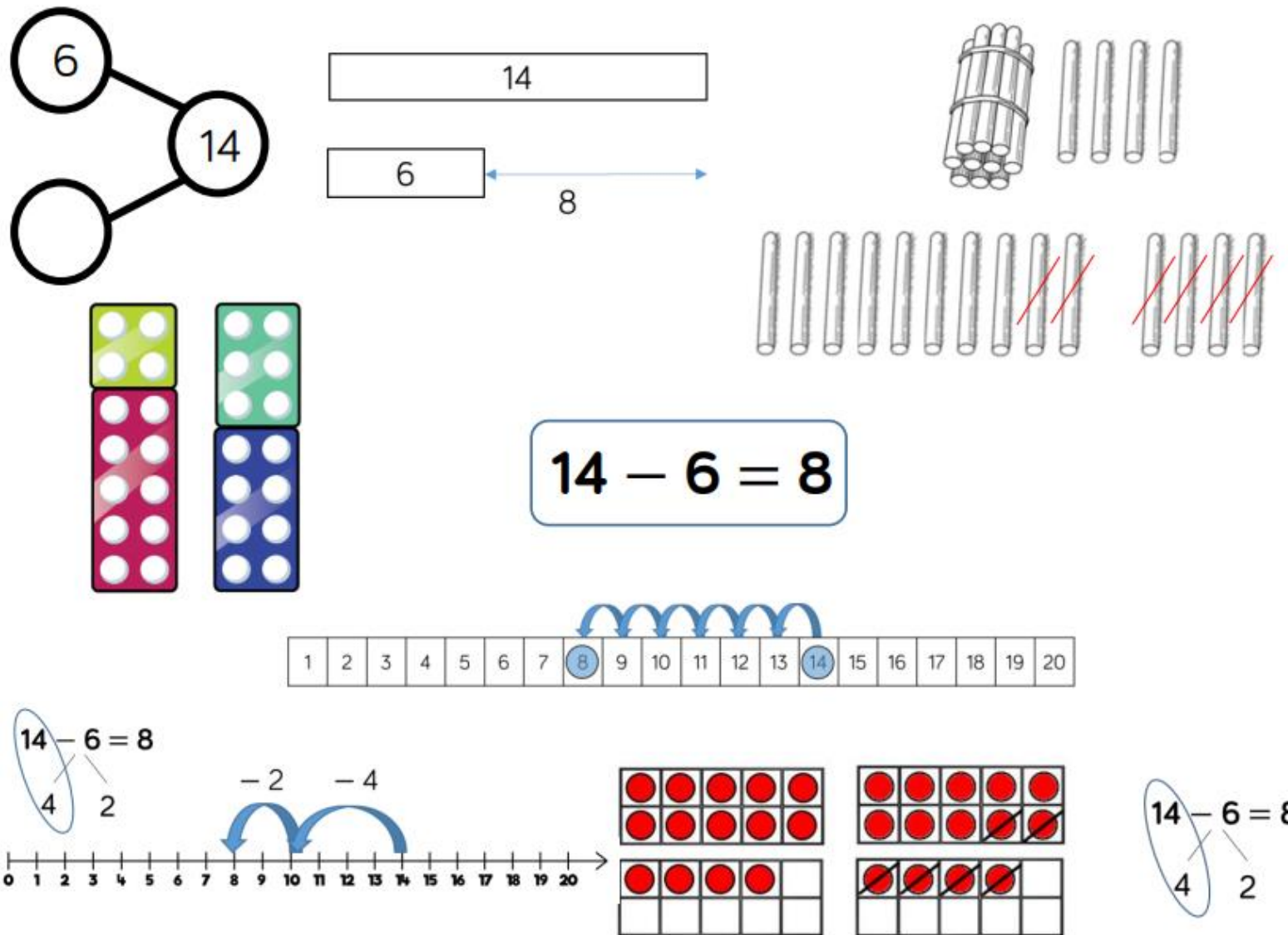
$$7 - 3 = 4$$



Part-whole models, bar models, ten frames and number shapes support partitioning.

Ten frames, number tracks, single bar models and bead strings support reduction.

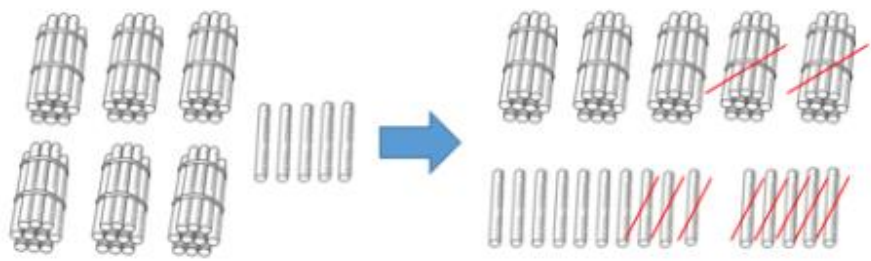
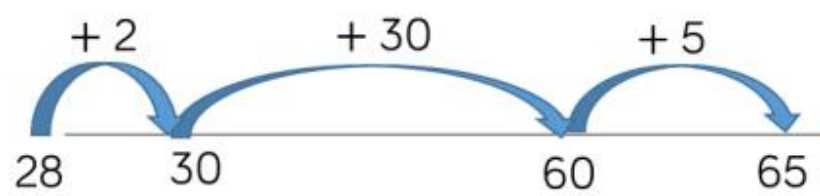
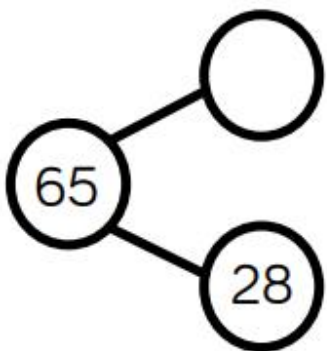
Cubes and bar models with two bars can support finding the difference.



In Year 1, subtracting one-digit numbers that cross 10, is done by counting back, using objects, number tracks and number lines.

From Year 2, children should be encouraged to find the number bond to 10 when partitioning the subtracted number.

Ten frames, number shapes and number lines are particularly useful for this.



65	
?	28

65 – 28 = 37

Tens	Ones

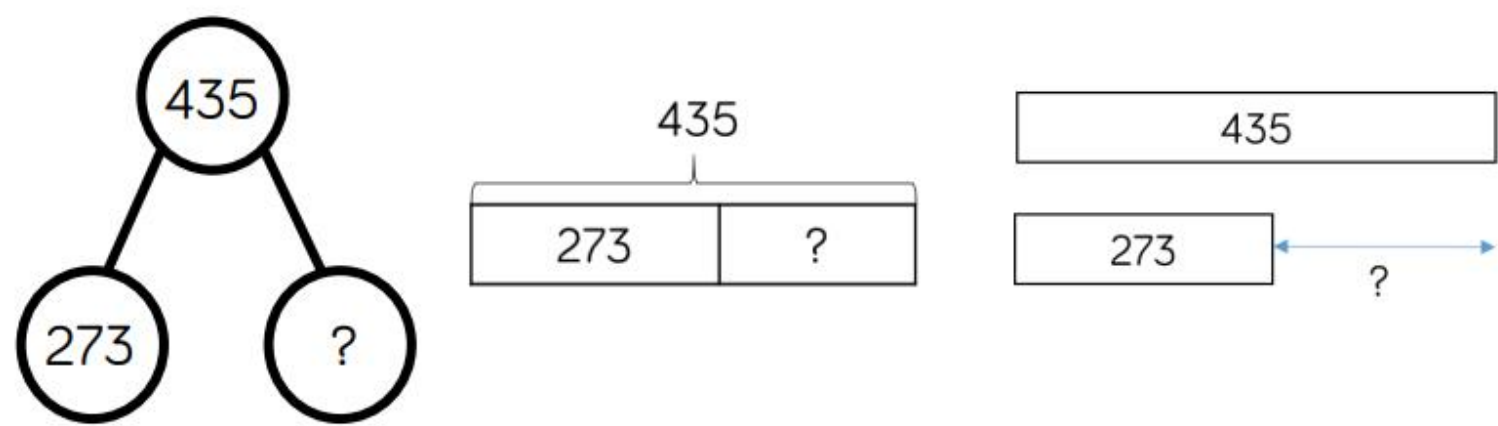
$$\begin{array}{r} 5 1 \\ 65 \\ - 28 \\ \hline 37 \end{array}$$

Tens	Ones

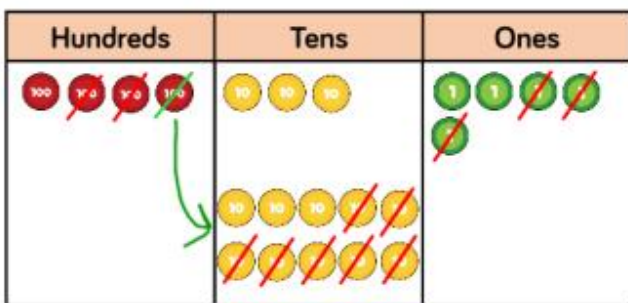
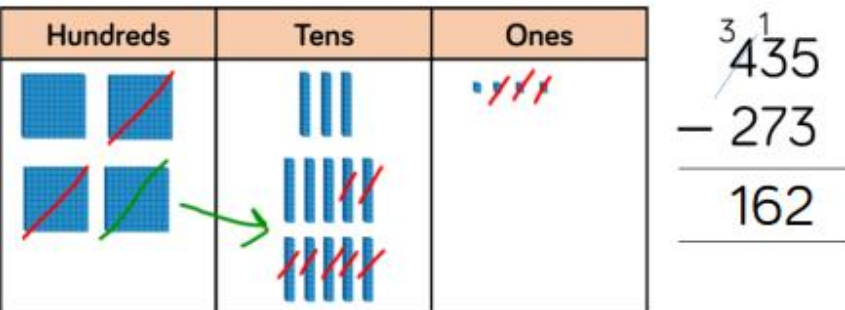
Children can also use a blank number line to count back to find the difference. Encourage them to jump to multiples of 10 to become more efficient.

From Year 2, 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.



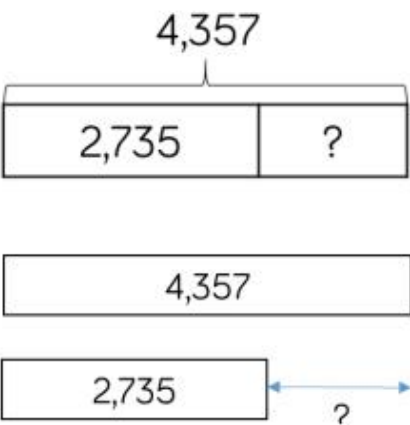
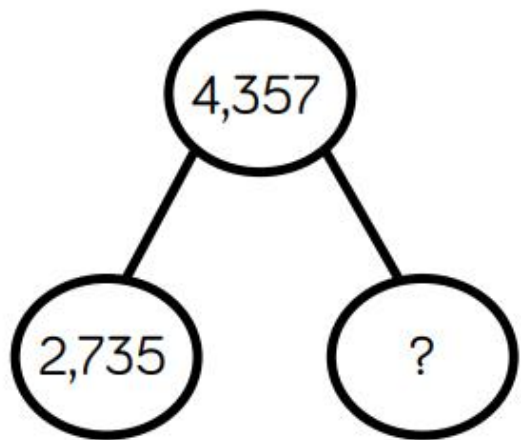
435 – 273 = 162



Base 10 and place value counters are the most effective manipulative 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.



$$\begin{array}{r} \overset{3}{4}\overset{1}{3}57 \\ - 2735 \\ \hline 1622 \end{array}$$

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

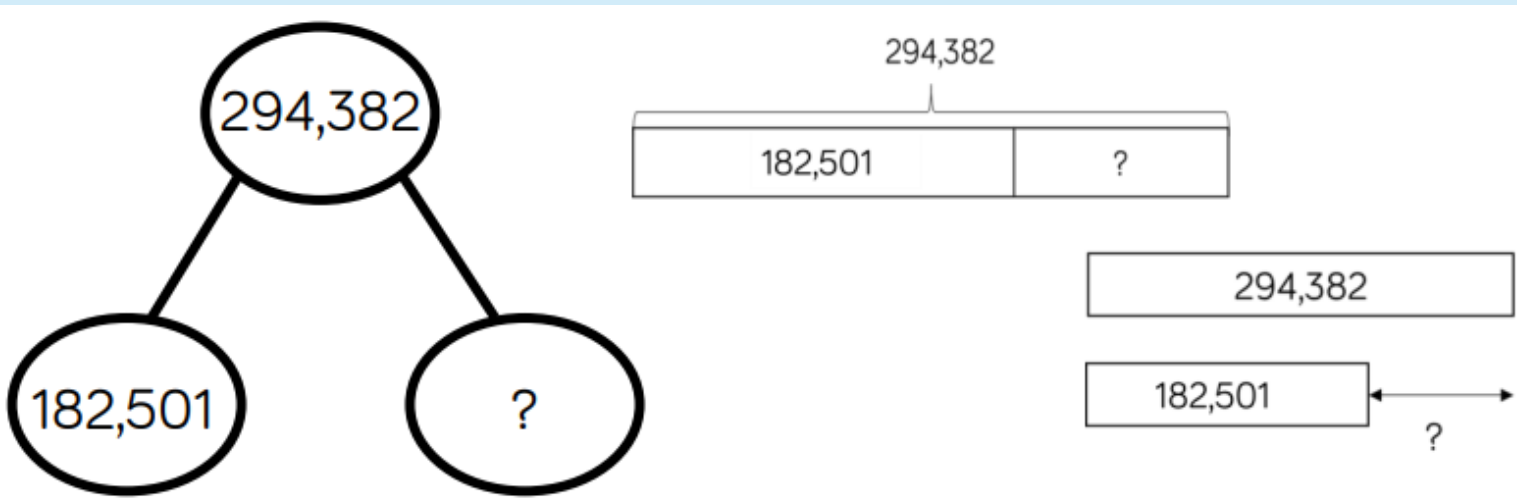
Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

Base 10 and place value counters are the most effective manipulatives when subtracting numbers with up to 4 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.



294,382 – 182,501 = 111,881

HTh	TTh	Th	H	T	O
<div>100000</div> <div>100000</div>	<div>10000</div> <div>10000</div> <div>10000</div> <div>10000</div> <div>10000</div> <div>10000</div>	<div>1000</div> <div>1000</div> <div>1000</div> <div>1000</div>	<div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div> <div>100</div>	<div>10</div> <div>10</div> <div>10</div> <div>10</div> <div>10</div> <div>10</div> <div>10</div>	<div>1</div> <div>1</div>

	2	9	3	13	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1

Place value counters or plain counters on a place value grid are the most effective concrete resource when subtracting numbers 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.

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.

2.7

?

5.43

5.43

2.7 ?

5.43

2.7 ?

5.43

2.7

?

5.43

2.7

2.73

5.43

2.7

2.73

Ones	Tenths	Hundredths
1 1 1 1	0.1 0.1 0.1 0.1	0.01 0.01 0.01
1	0.1 0.1 0.1 0.1	
	0.1 0.1 0.1 0.1	
	0.1 0.1	

Ones	Tenths	Hundredths
4 1		
5.43		
2.7		
2.73		

Glossary

Addend - A number to be added to another.

Aggregation - combining two or more quantities or measures to find a total.

Augmentation - increasing a quantity or measure by another quantity.

Commutative - numbers can be added in any order.

Complement - in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

Difference - the numerical difference between two numbers is found by comparing the quantity in each group.

Exchange - Change a number or expression for another of an equal value.

Minuend - A quantity or number from which another is subtracted.

Partitioning - Splitting a number into its component parts.

Reduction - Subtraction as take away.

Subitise - Instantly recognise the number of objects in a small group without needing to count.

Subtrahend - A number to be subtracted from another.

Sum - The result of an addition.

Total - The aggregate or the sum found by addition.