

Maths Calculation Policy

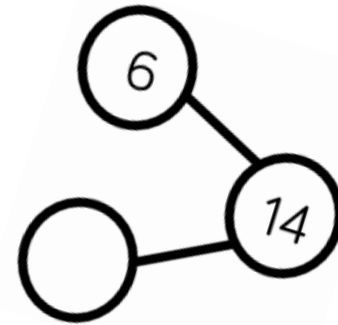
Warstones Primary School

March 2022





| | | | | |
|---|----|---|---|---|
| | Th | H | T | O |
| | 1 | 8 | 2 | 6 |
| x | | | | 3 |
| | 5 | 4 | 7 | 8 |
| | 2 | | 1 | |



Welcome to our calculation policy!

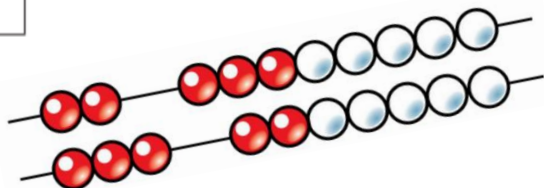
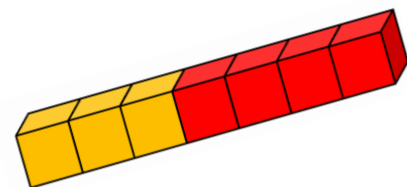
This document is broken down into addition, subtraction, multiplication and division.


Each operation is broken down into skills and the different models and images that could be used to effectively teach that concept.

For each concept, we demonstrate the models for concrete, pictorial and abstract and how we use a balance of these three techniques throughout our maths curriculum.

| H | T | O |
|---------|----|---|
| 100 100 | 10 | 1 |
| 100 100 | 10 | 1 |
| 100 100 | 10 | 1 |
| 100 100 | 10 | 1 |

| | | | | |
|--|---|---|---|----|
| | | 2 | 1 | 4 |
| | 4 | 8 | 5 | 16 |

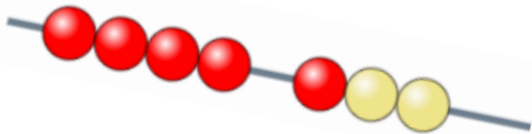
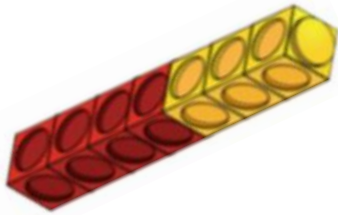




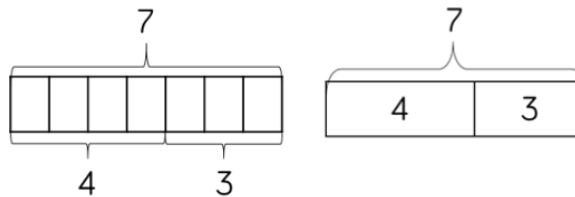
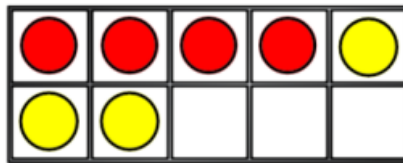
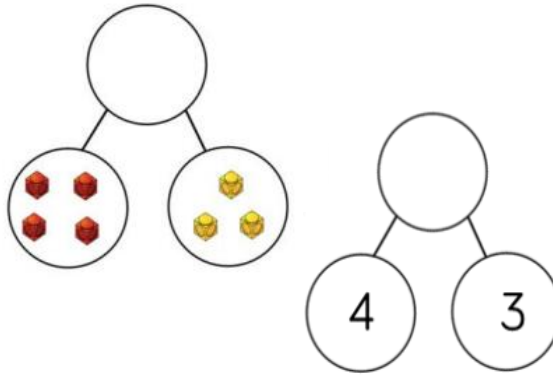
Counting & Addition

Addition Skill: Add 1-digit numbers within 10 (Year 1)

Concrete



Pictorial

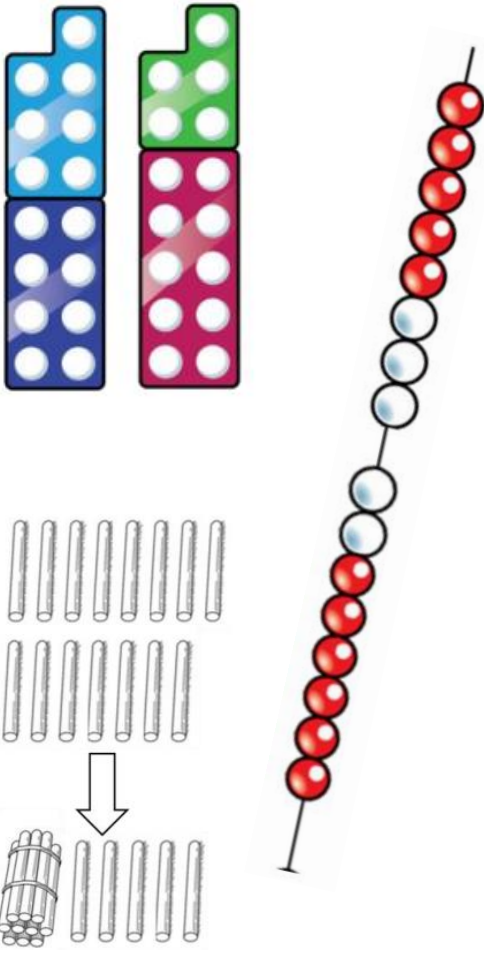
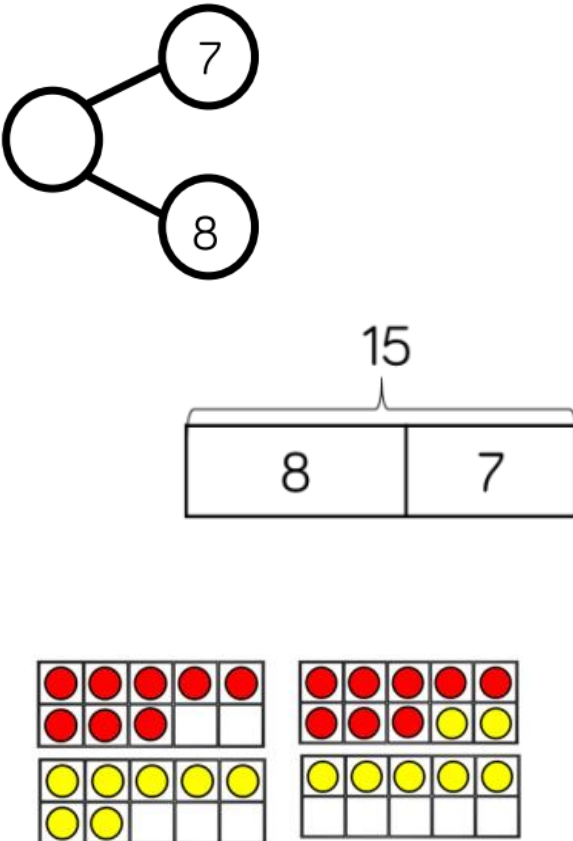


Abstract

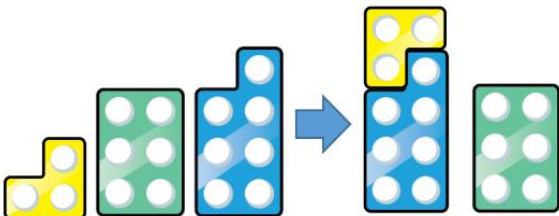
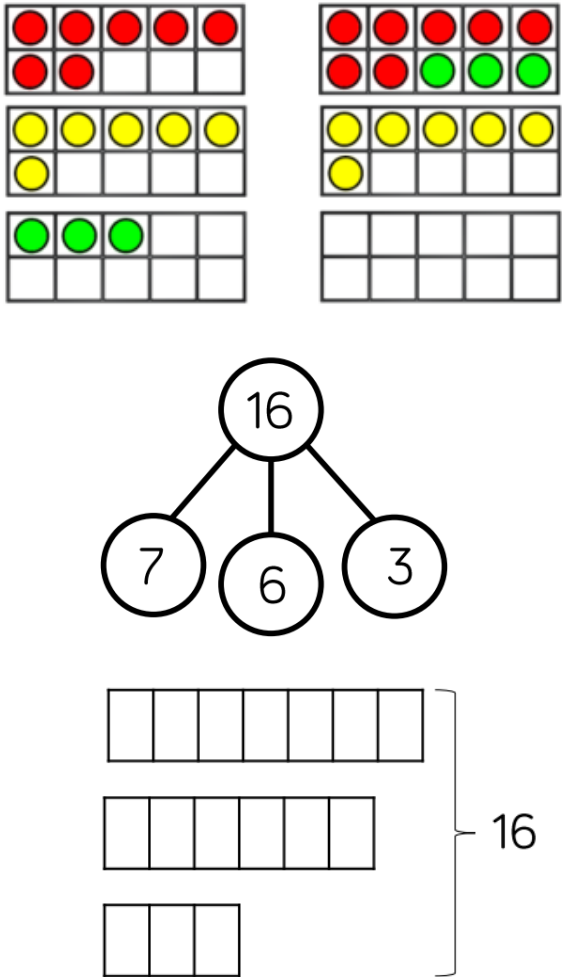
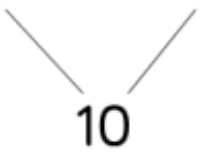
$$4 + 3 = 7$$

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

Addition Skill: Add 1 and 2-digit numbers to 20 (Years 1-2)

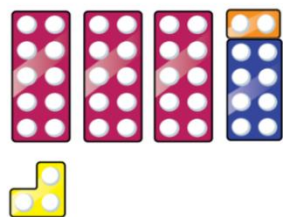
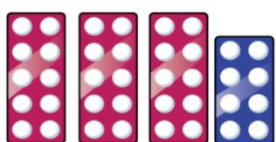
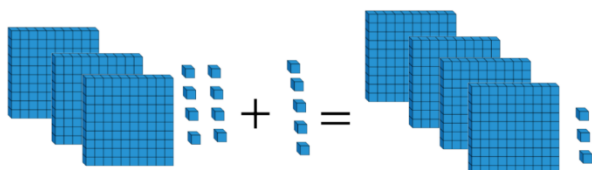
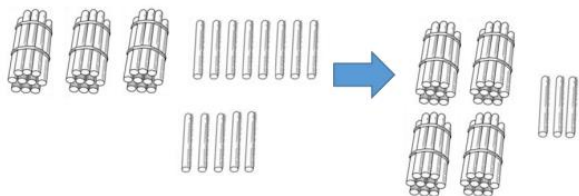
| Concrete | Pictorial | Abstract |
|--|---|---|
|  |  | <p data-bbox="1467 391 1713 614">$8 + 7 = 15$</p> <div data-bbox="1646 630 2027 758" style="border: 1px solid black; padding: 5px; display: inline-block;"> $8 + 7 = 15$ </div> <p data-bbox="1444 798 2027 997">When adding one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten.</p> <p data-bbox="1444 1053 2049 1356">Different manipulatives can be used to represent this exchange. Concrete resources are used alongside number lines to support children in understanding how to partition jumps.</p> |

Addition Skill: Add three 1-digit numbers (Year 2)

| Concrete | Pictorial | Abstract |
|---|---|--|
|  |  | <p data-bbox="1485 387 1843 443">$7 + 6 + 3 = 16$</p>  <div data-bbox="1458 667 2018 799" style="border: 1px solid black; border-radius: 15px; padding: 10px; text-align: center;"> <p data-bbox="1491 699 1984 770">$7 + 6 + 3 = 16$</p> </div> <p data-bbox="1447 831 2007 1054">Children are encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.</p> <p data-bbox="1447 1118 2029 1390">Manipulatives that highlight number bonds to 10, such as Numicon, are most effective when adding three 1-digit numbers.</p> |

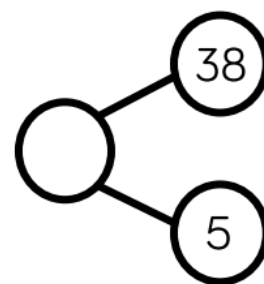
Addition Skill: Add 1-digit and 2-digit numbers to 100 (Years 2-3)

Concrete



Pictorial

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



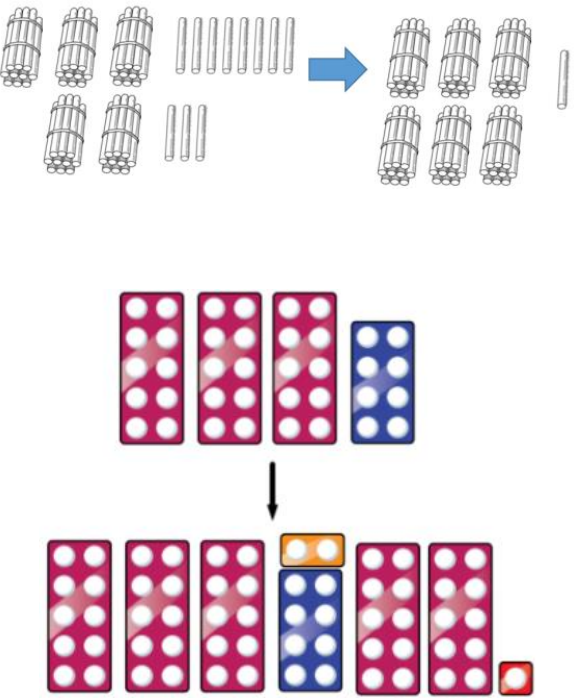
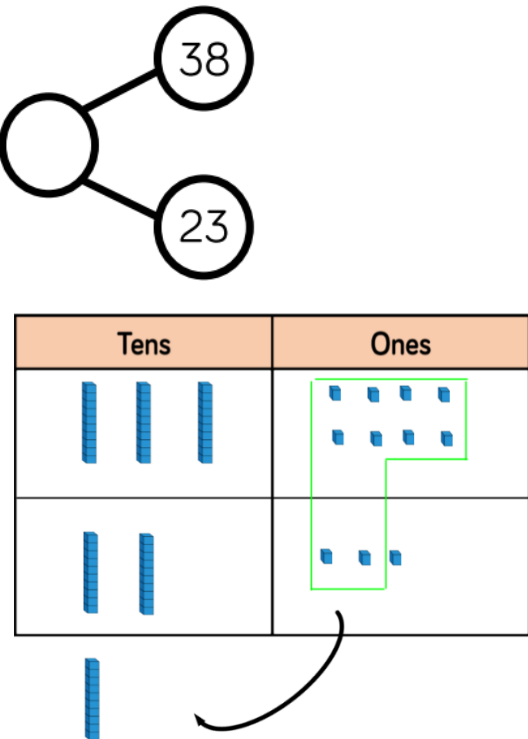
Abstract

$$38 + 5 = 43$$

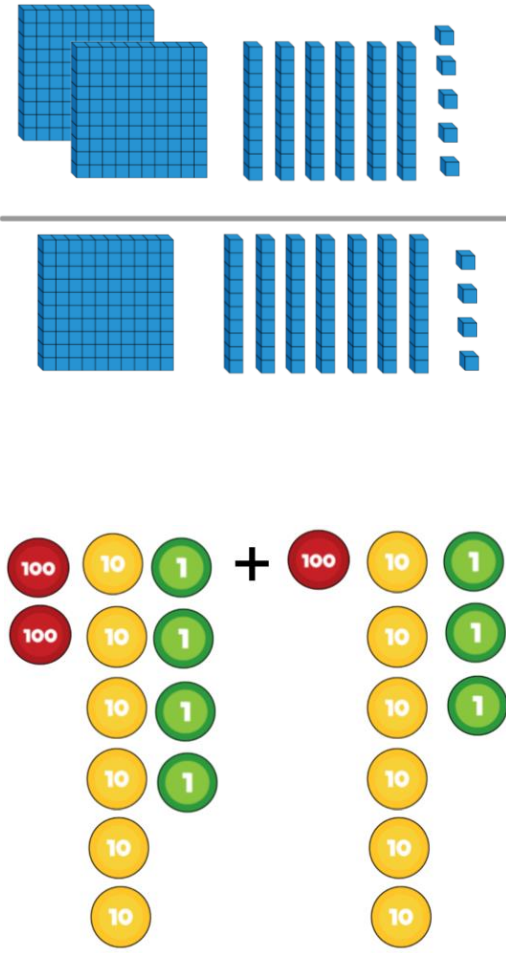
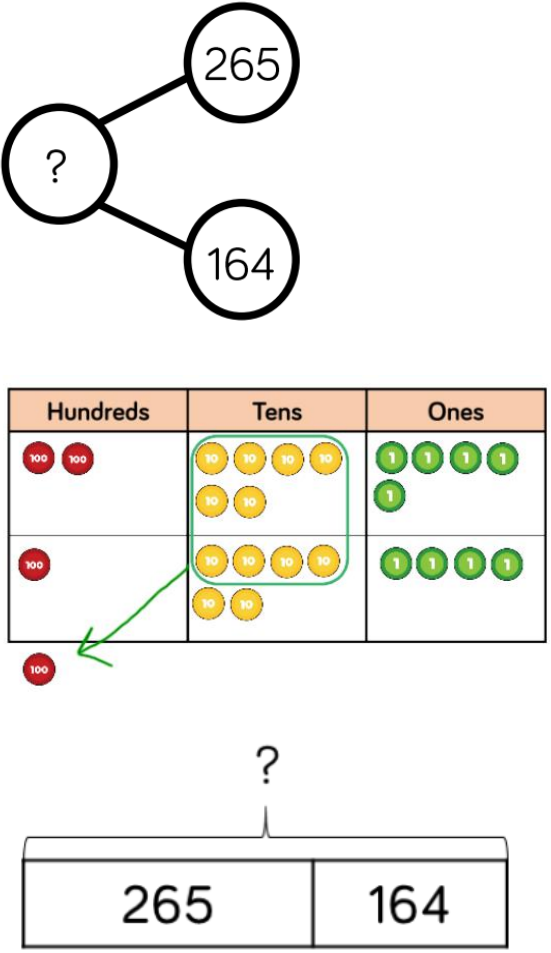
When adding single digits to a two-digit number, children are encouraged to count on from the larger number.

They also apply their knowledge of number bonds to add more efficiently. Hundred squares and straws support children to find these bonds.

Addition Skill: Add two 2-digit numbers to 100 (Years 2-3)

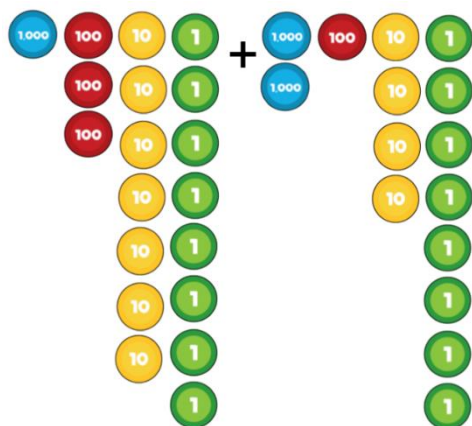
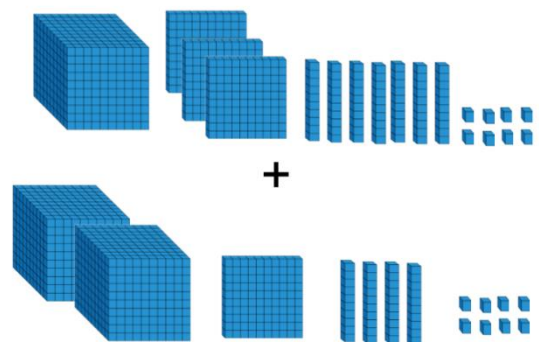
| Concrete | Pictorial | Abstract |
|---|---|--|
|  <p>The concrete stage shows two methods. The top method uses bundles of straws: 3 bundles of 10 and 8 individual straws for 38, and 2 bundles of 10 and 3 individual straws for 23. An arrow points to the result: 6 bundles of 10 and 1 individual straw for 61. The bottom method uses place value blocks: three ten-blocks and eight one-blocks for 38, and two ten-blocks and three one-blocks for 23. An arrow points to the result: six ten-blocks and one one-block for 61.</p> |  <p>The pictorial stage includes a tree diagram showing 38 and 23 branching from a single point. Below it is a place value chart with columns for Tens and Ones. The Tens column contains three blue vertical bars representing 30, and the Ones column contains eight blue dots representing 8. A second row shows two blue vertical bars for 20 and three blue dots for 3. A green box highlights the 8 dots in the top row and the 3 dots in the bottom row, with an arrow pointing to a single blue vertical bar in the Tens column below, representing the exchange of 10 ones for 1 ten.</p> | <div style="text-align: center;"> $\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ \hline 1 \end{array}$ </div> <p>At this stage, children are encouraged 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 also use a blank number line to count on to find the total. Children jump to multiples of 10 to become more efficient.</p> |

Addition Skill: Add numbers with up to 3 digits (Year 3)

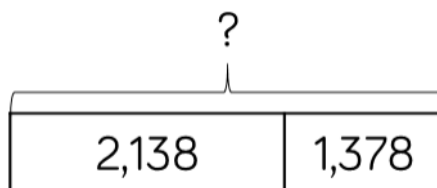
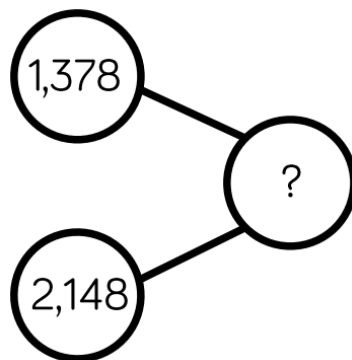
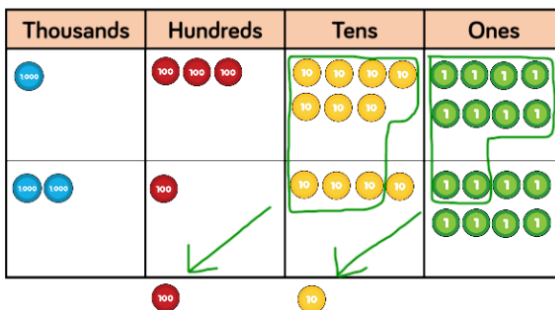
| Concrete | Pictorial | Abstract | | | | | | | | | |
|--|---|--------------|------|------|---------|----------------------|--------------|-----|----------------------|---------|---|
|  <p>The concrete stage shows two sets of base ten blocks. The first set represents 265: two hundred flats, six ten rods, and five one units. The second set represents 164: one hundred flat, six ten rods, and four one units. Below this, the same numbers are represented using circular base ten blocks: two red 100s, six yellow 10s, and five green 1s for 265; and one red 100, six yellow 10s, and four green 1s for 164. A plus sign is between the two groups.</p> |  <p>The pictorial stage shows a tree diagram with a question mark in a circle at the top, connected to two circles containing '265' and '164'. Below this is a place value chart:</p> <table border="1" data-bbox="855 715 1395 970"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>100 100</td> <td>10 10 10 10 10 10</td> <td>1 1 1 1 1</td> </tr> <tr> <td>100</td> <td>10 10 10 10 10 10</td> <td>1 1 1 1</td> </tr> </tbody> </table> <p>A green arrow points from the 100 in the second row to a red 100 block below the chart. Below the chart is a box with a question mark above it, containing two sections: '265' and '164'.</p> | Hundreds | Tens | Ones | 100 100 | 10 10 10 10 10 10 | 1 1 1 1 1 | 100 | 10 10 10 10 10 10 | 1 1 1 1 | $ \begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ \hline 1 \end{array} $ <p>Base 10 and place value counters are effective manipulatives when adding numbers with up to 3 digits.</p> <p>Children write out their calculation alongside concrete resources to see the links to the written column method.</p> |
| Hundreds | Tens | Ones | | | | | | | | | |
| 100 100 | 10 10 10 10 10 10 | 1 1 1 1 1 | | | | | | | | | |
| 100 | 10 10 10 10 10 10 | 1 1 1 1 | | | | | | | | | |

Addition Skill: Add numbers with up to 4 digits (Year 4)

Concrete



Pictorial



Abstract

| | | | | |
|-------|---|---|---|---|
| | 1 | 3 | 7 | 8 |
| + | 2 | 1 | 4 | 8 |
| <hr/> | | | | |
| | 3 | 5 | 2 | 6 |
| | | 1 | 1 | |

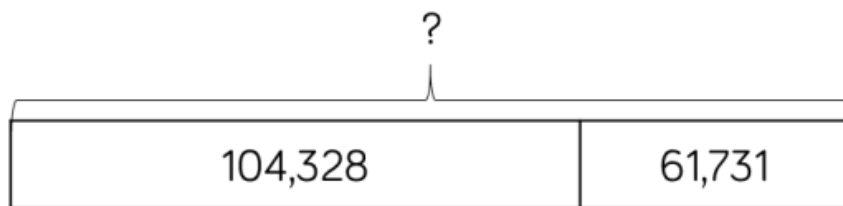
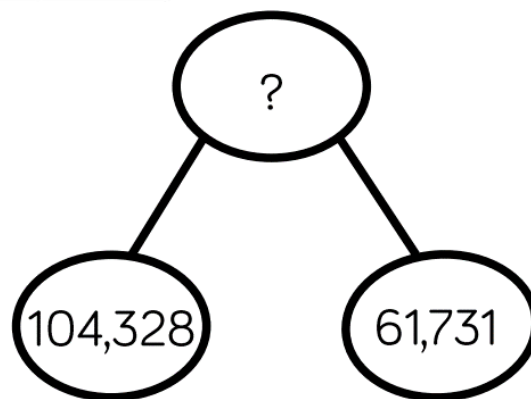
Base 10 and place value counters are effective manipulatives when adding numbers with up to 4 digits.

Children write out their calculation alongside concrete resources to see the links to the written column method.

Addition Skill: Add numbers with more than 4 digits (Years 5-6)

Concrete & Pictorial

| HTh | TTh | Th | H | T | O |
|---------|--|----------------------------|-----------------------------------|----------|-----------------------|
| 100,000 | | 1,000 1,000 1,000 1,000 | 100 100 100 | 10 10 | 1 1 1 1 1 1 1 1 |
| | 10,000 10,000 10,000 10,000 10,000 10,000 | 1,000 | 100 100 100 100 100 100 100 | 10 10 10 | 1 |



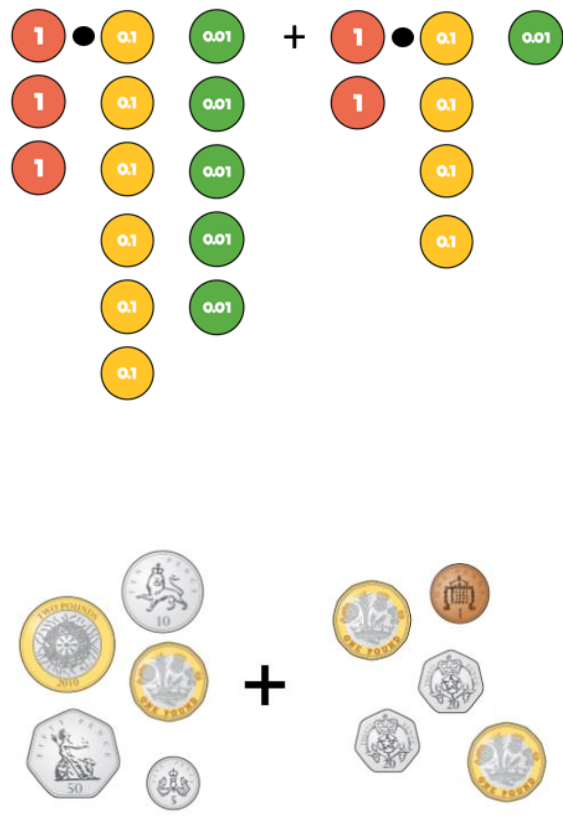
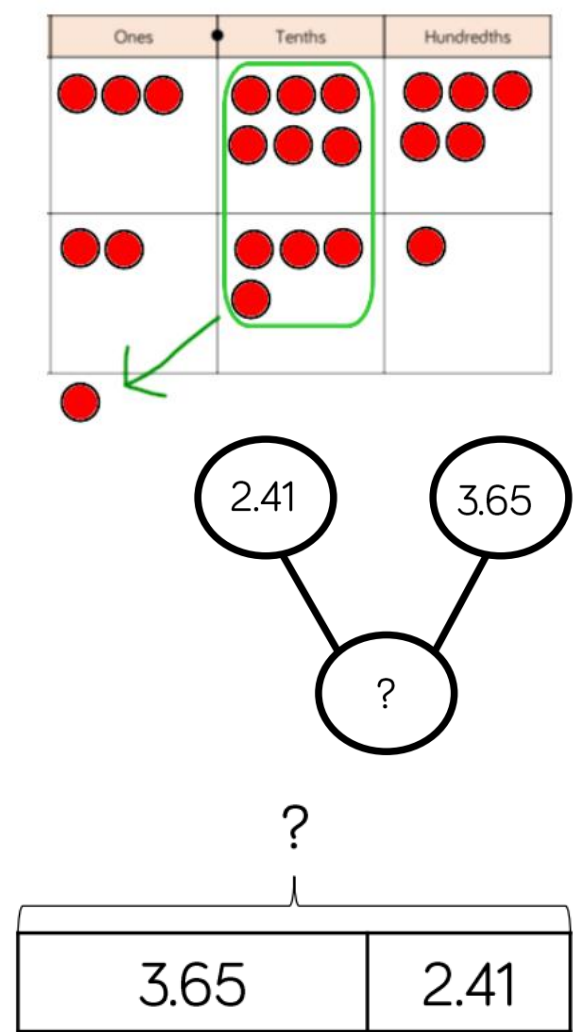
Abstract

| | | | | | |
|-------|---|---|---|---|---|
| 1 | 0 | 4 | 3 | 2 | 8 |
| + | 6 | 1 | 7 | 3 | 1 |
| <hr/> | | | | | |
| 1 | 6 | 6 | 0 | 5 | 9 |
| | | | | | 1 |

Place value counters or plain counters on a place value grid are effective concrete resources when adding numbers with more than 4 digits.

Children are encouraged to work in the abstract, using the column method to add larger numbers.

Addition Skill: Add with up to 3 decimal places (Year 5)

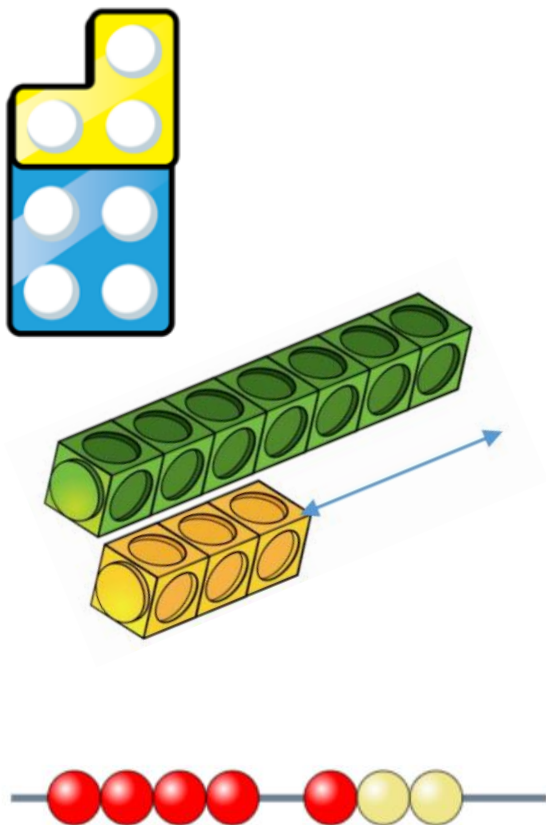
| Concrete | Pictorial | Abstract |
|--|---|---|
|  <p>Concrete representation of 3.65 + 2.41 using base 10 blocks and coins. The top part shows base 10 blocks: 3 ones (red), 6 tenths (yellow), and 5 hundredths (green) plus 2 ones (red), 4 tenths (yellow), and 1 hundredth (green). The bottom part shows British coins: three £1 coins, six 10p coins, and five 2p coins plus two £1 coins, four 10p coins, and one 2p coin.</p> |  <p>Pictorial representation of 3.65 + 2.41 using a place value chart and a number line. The place value chart has columns for Ones, Tenths, and Hundredths. The top row (3.65) has 3 ones, 6 tenths, and 5 hundredths. The bottom row (2.41) has 2 ones, 4 tenths, and 1 hundredth. A green box highlights 10 tenths (1 one and 0 tenths) which are moved to the ones column, resulting in 4 ones, 0 tenths, and 6 hundredths. A number line below shows 3.65 and 2.41 with a question mark above them, and a box below containing 3.65 and 2.41.</p> | <p>Abstract representation of 3.65 + 2.41 = 6.06. The sum is shown with a carry of 1 from the hundredths column.</p> $\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$ <p>Base 10 and place value counters are effective manipulatives when adding decimals with 1, 2 and 3 decimal places.</p> <p>Children experience adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.</p> |



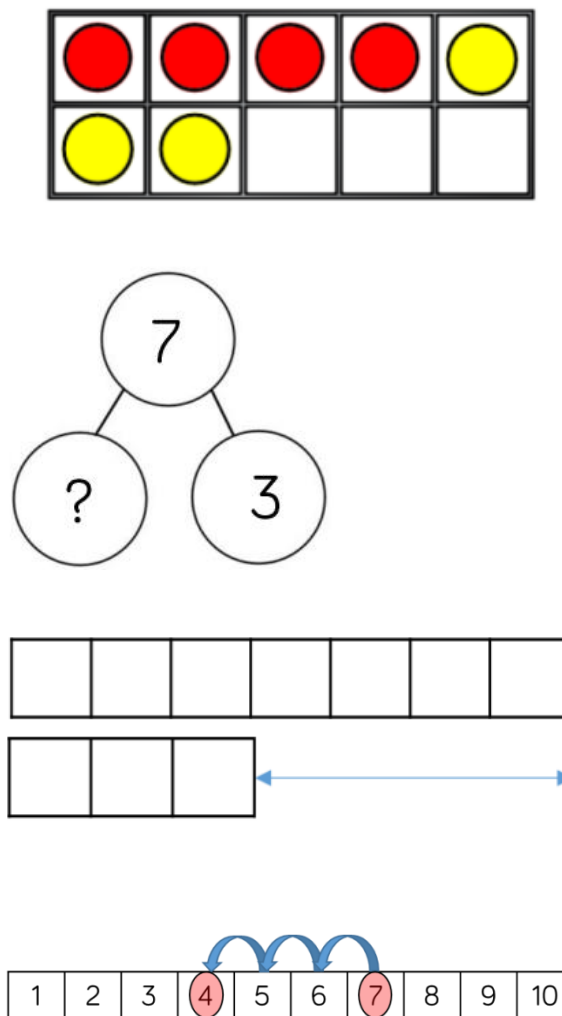
Subtraction

Subtraction Skill: Subtract 1-digit numbers within 10 (Year 1)

Concrete



Pictorial



Abstract

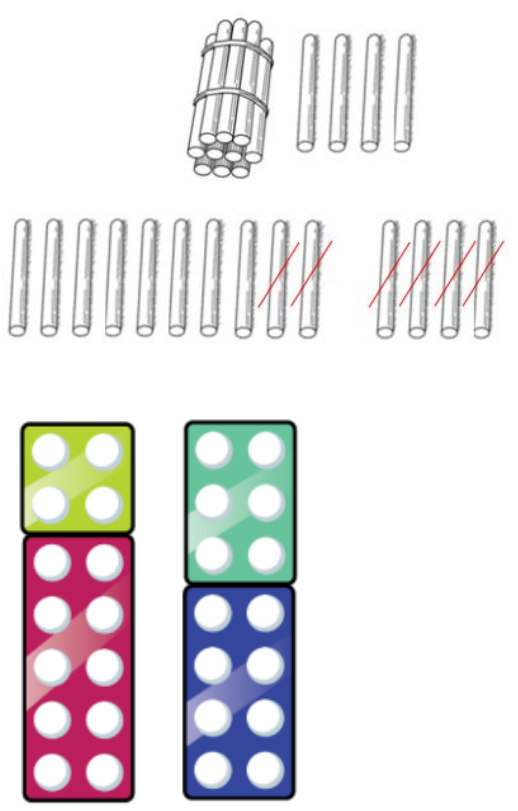
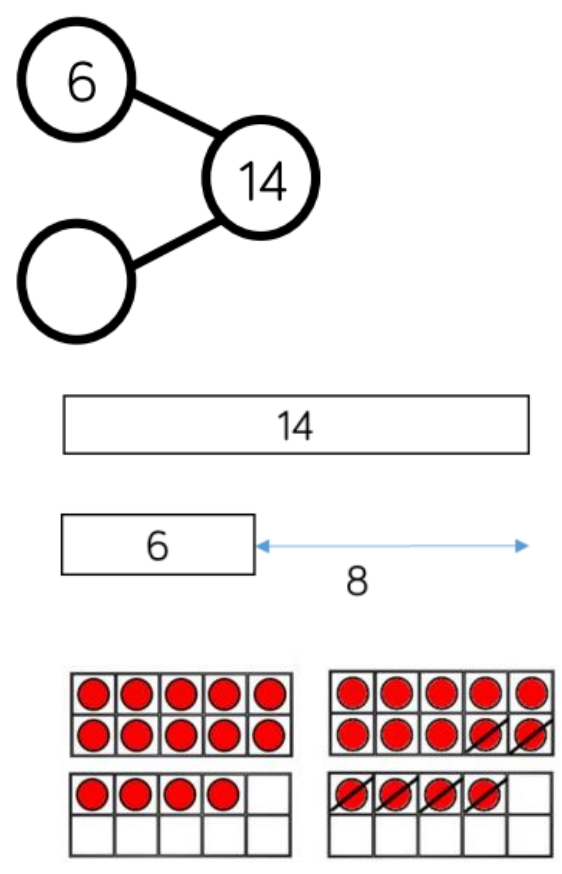
$$7 - 3 = 4$$

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

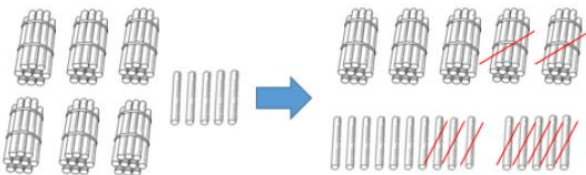
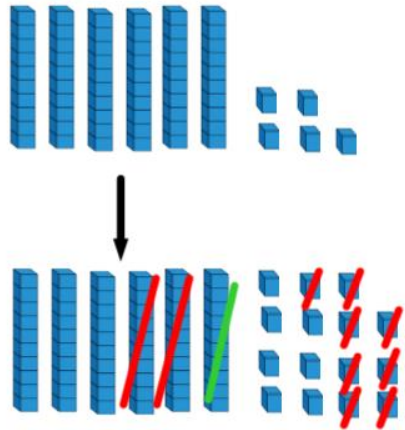
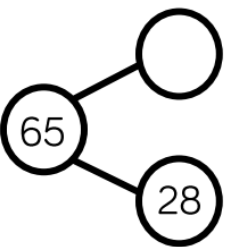
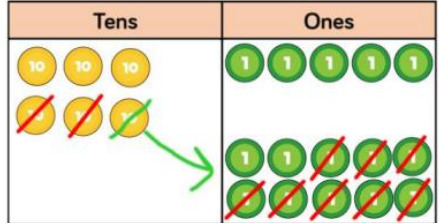
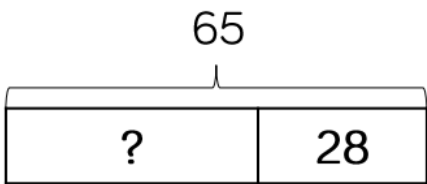
Ten frames, number tracks, single bar models and bead strings support reduction.

Cubes and bar models can support finding the difference.

Subtraction Skill: Subtract 1 and 2-digit numbers to 20 (Years 1-2)

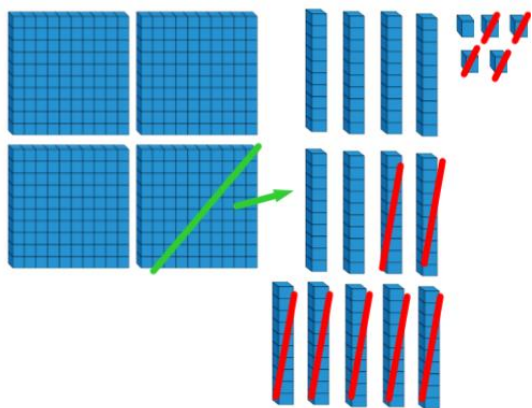
| Concrete | Pictorial | Abstract |
|--|---|--|
|  <p>The concrete stage shows 14 sticks (one bundle of ten and four individual sticks) and 6 individual sticks. Below, two ten frames are shown: a red one with 10 dots and a blue one with 4 dots, representing 14. A number line at the bottom shows a jump from 8 to 14.</p> |  <p>The pictorial stage shows a number bond with 6 and an empty circle connected to 14. Below, a bar model shows 14 minus 6. A ten frame shows 14 red dots, with 6 crossed out. A number line shows a jump from 6 to 14.</p> | <div data-bbox="1523 399 1971 558">$14 - 6 = 8$</div> <p>When subtracting one-digit numbers that cross 10, we highlight the importance of ten ones equalling one ten.</p> <p>Children are encouraged to find the number bond to 10 when partitioning the subtracted number.</p> |

Subtraction Skill: Subtract 1 and 2-digit numbers to 100 (Year 2)

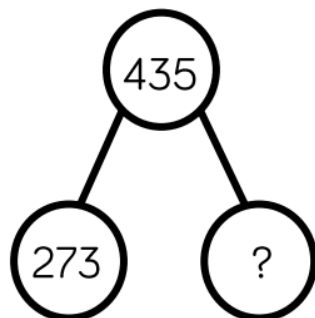
| Concrete | Pictorial | Abstract |
|---|---|---|
|   |    | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $65 - 28 = 37$ </div> $\begin{array}{r} 65 \\ - 28 \\ \hline 37 \end{array}$ <p>At this stage, children are encouraged to use the formal method when calculating alongside straws, base 10 or place value counters. As numbers become larger, straws become less efficient.</p> <p>Children also use a blank number line to count on to find the difference. Children are encouraged to jump in multiples of 10 to become more efficient.</p> |

Subtraction Skill: Subtract numbers with up to 3 digits (Year 3)

Concrete

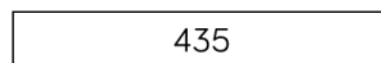


Pictorial



| Hundreds | Tens | Ones |
|----------|------|------|
| | | |

435



Abstract

$$435 - 273 = 262$$

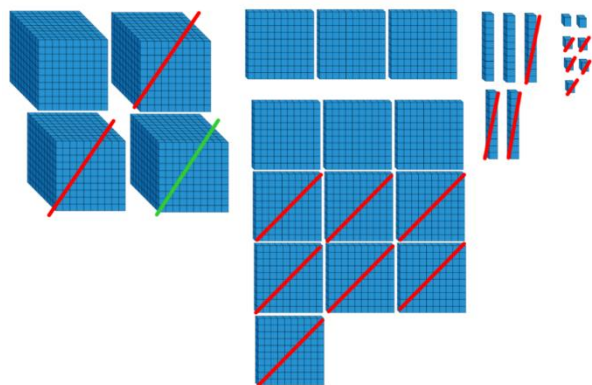
$$\begin{array}{r} \overset{3}{4} \overset{1}{3} 5 \\ - 273 \\ \hline 262 \end{array}$$

Base 10 and Place Value counters are the most effective manipulative when subtracting numbers with up to 3 digits.

Children write out the calculation alongside any concrete resources so they can see the links to the written column method.

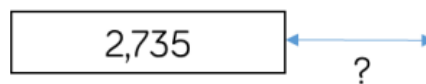
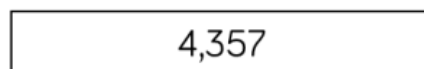
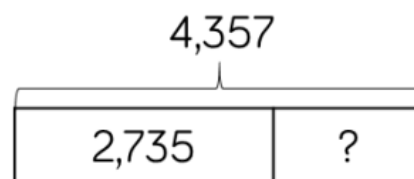
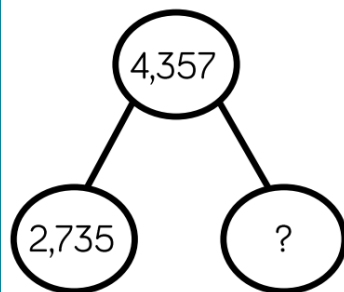
Subtraction Skill: Subtract with up to 4 digits (Year 4)

Concrete



| Thousands | Hundreds | Tens | Ones |
|-----------|----------|---------|--------|
| 4 1000 | 3 100 | 5 10 | 7 1 |
| 2 1000 | 7 100 | 3 10 | 5 1 |
| 2 1000 | 6 100 | 2 10 | 2 1 |

Pictorial



Abstract

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

$$\begin{array}{r} 3 \ 1 \\ 4357 \\ - 2735 \\ \hline 1622 \end{array}$$

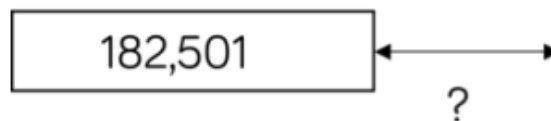
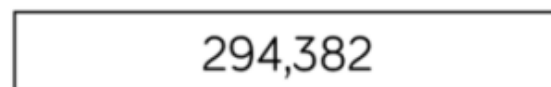
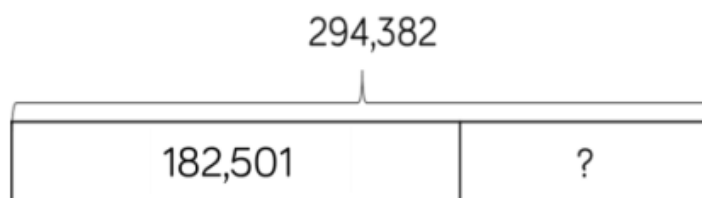
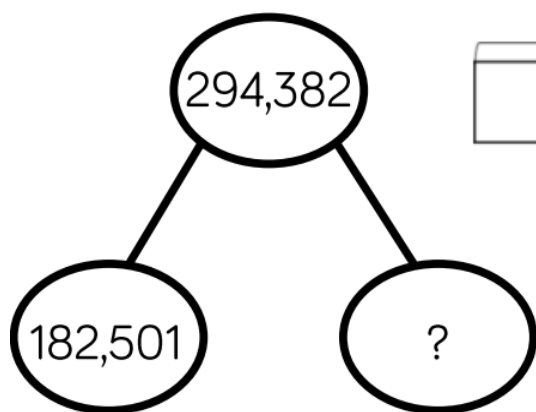
Base 10 and Place Value counters are the most effective manipulative when subtracting numbers with up to 4 digits.

Children write out the calculation alongside any concrete resources so they can see the links to the written column method.

Subtraction Skill: Subtract numbers with more than 4 digits (Years 5-6)

Concrete & Pictorial

| HTh | TTh | Th | H | T | O |
|-----|-----|----|---|---|---|
| | | | | | |



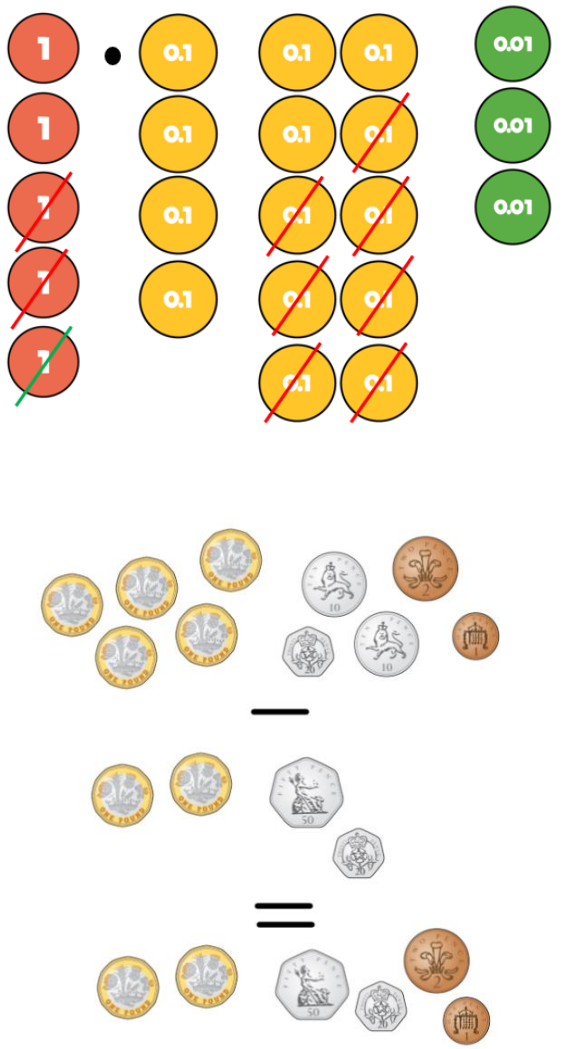
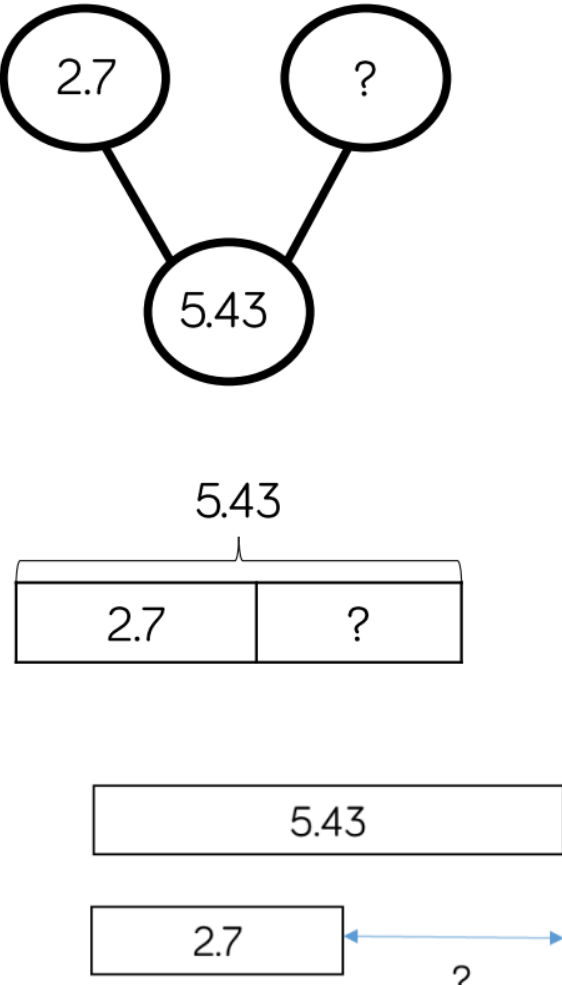
Abstract

| | | | | | | |
|---|---|---|--------------|---------------|---|---|
| | 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 are encouraged to work in the abstract, using column method to subtract larger numbers efficiently.

Subtraction Skill: Subtract with up to 3 decimal places (Year 5)

| Concrete | Pictorial | Abstract |
|---|--|---|
|  <p>The concrete stage shows place value counters for 5.43 (one 1, five 0.1, three 0.01) and 2.7 (two 1, seven 0.1). The 2.7 is crossed out, and the remaining 2.73 is shown. Below, coins represent the same: 5.43 (one 5p, four 10p, three 2p) minus 2.7 (two 10p, seven 2p) equals 2.73 (two 10p, seven 2p).</p> |  <p>The pictorial stage uses circles to show 5.43 composed of 2.7 and an unknown (?). Below, a box labeled 5.43 is divided into two sections: 2.7 and ?. A second box labeled 2.7 has a blue arrow pointing to the right towards a question mark, indicating the amount to be subtracted.</p> | <p>Abstract representation of the subtraction:</p> $\begin{array}{r} 4 \quad 1 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$ <p>Place value counters are the most effective manipulative when subtracting decimals with 1, 2 and then 3 decimal places.</p> <p>Children have experience of subtracting decimals with a variety of decimal places. This includes putting this into context when subtracting money and other measures.</p> |

Addition and Subtraction Vocabulary

Addend: A number to be added to another.

Aggregation: Combining two or more quantities or measures to find the total.

Augmentation: Increasing a quantity or a 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.

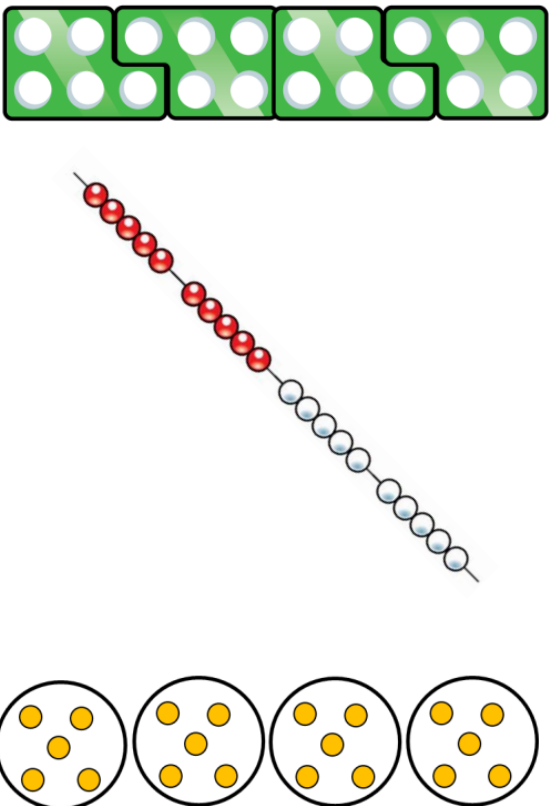
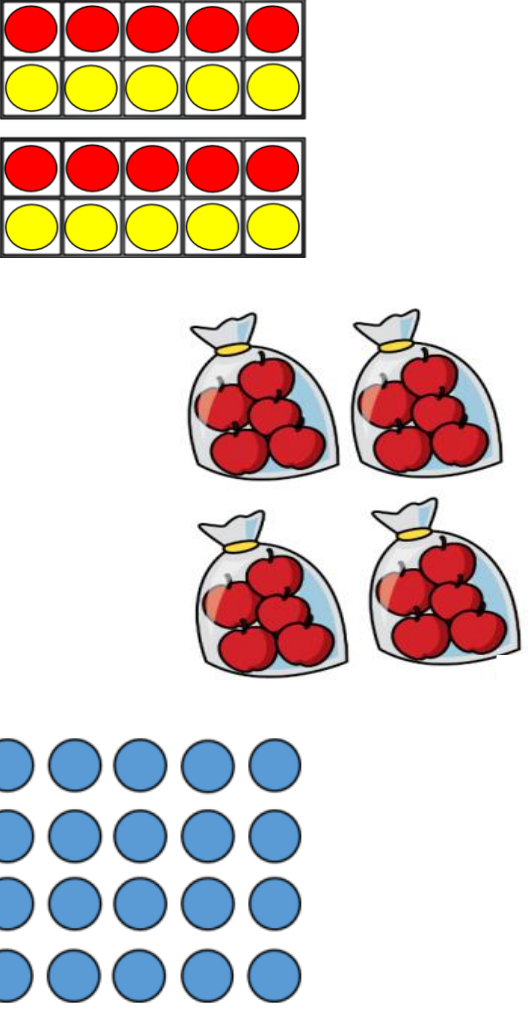
Sum: The result of an addition.

Total: The aggregate or the sum found by an addition.



Multiplication

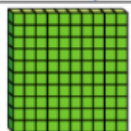
Multiplication Skill: Solve 1-step problems using multiplication (Years 1-2)

| Concrete | Pictorial | Abstract |
|--|---|--|
|  |  | <p data-bbox="1574 339 1944 379">$5 + 5 + 5 + 5 = 20$</p> <p data-bbox="1641 411 1843 451">$4 \times 5 = 20$</p> <p data-bbox="1641 475 1843 515">$5 \times 4 = 20$</p> <div data-bbox="1462 555 2047 683" style="border: 1px solid black; border-radius: 10px; padding: 10px;"><p data-bbox="1485 579 2000 659">One bag holds 5 apples. How many apples do 4 bags hold?</p></div> <p data-bbox="1451 738 2022 890">Children represent multiplication as repeated addition in many different ways.</p> <p data-bbox="1451 946 2022 1193">In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.</p> <p data-bbox="1451 1257 1910 1425">In Year 2, children are introduced to the multiplication symbol.</p> |

Multiplication Skill: Multiply 2-digit numbers by 1-digit numbers (Years 3-4)

Concrete & Pictorial

| Hundreds | Tens | Ones |
|----------|------|------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



| Hundreds | Tens | Ones |
|----------|------|------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Abstract

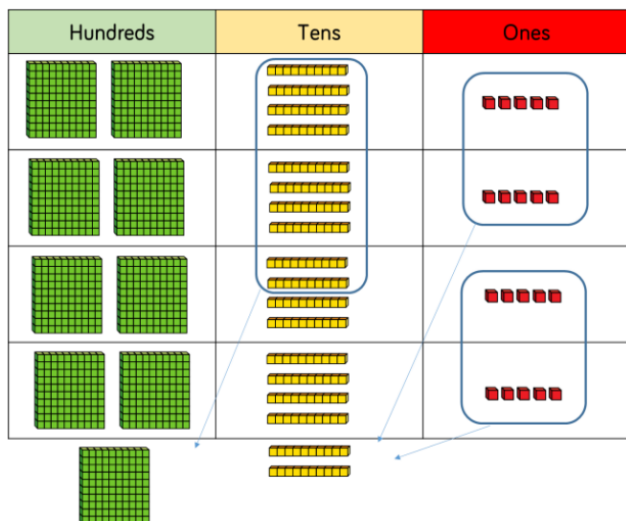
| | H | T | O |
|---|---|---|---|
| | | 3 | 4 |
| x | | | 5 |
| | 1 | 7 | 0 |
| | 1 | 2 | |

Children are first introduced to the expanded column method before moving onto the short multiplication method.

The place value counters are used to support the understanding of method, rather than supporting the multiplication, as children should use their times table knowledge,

Multiplication Skill: Multiply 3-digit numbers by 1-digit numbers (Years 3-4)

Concrete & Pictorial



Abstract

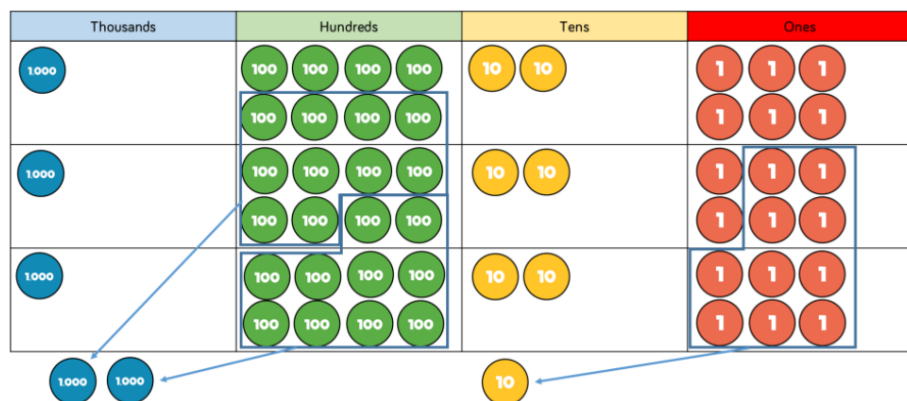
| | H | T | O |
|-------|---|---|---|
| | 2 | 4 | 5 |
| x | | | 4 |
| <hr/> | | | |
| | 9 | 8 | 0 |
| | 1 | 2 | |

When moving to 3-digit by 1-digit multiplication, children are encouraged to move towards the short, formal written method.

Base 10 and place value counters continue to support the understanding of the written method. The number of exchanges are limited and children move away from concrete resources when multiplying larger numbers.

Multiplication Skill: Multiply 4-digit numbers by 1-digit numbers (Year 5)

Concrete & Pictorial



Abstract

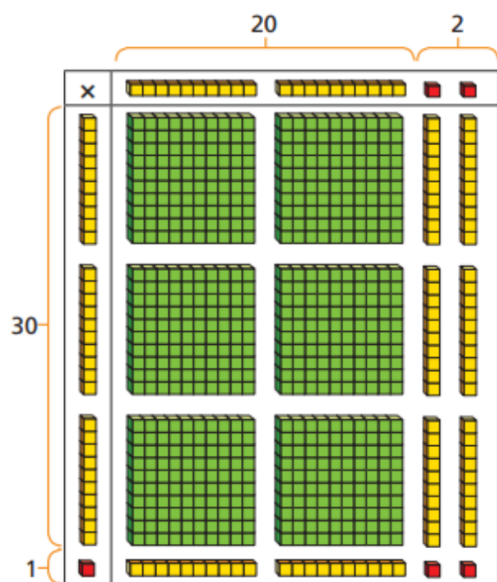
| | Th | H | T | O |
|---|----|---|---|---|
| | 1 | 8 | 2 | 6 |
| × | | | | 3 |
| | 5 | 4 | 7 | 8 |
| | 2 | | 1 | |

When multiplying 4-digit numbers, place value counters are the best manipulative for supporting children in their understanding of the formal written method.

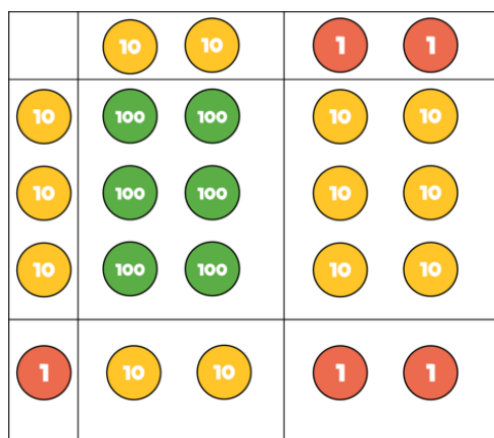
If children are multiplying larger numbers and struggling with their times tables, they are encouraged to use multiplication grids so they can focus on the use of the written method.

Multiplication Skill: Multiply 2-digit numbers by 2-digit numbers (Year 5)

Concrete & Pictorial



Optional Support



Optional Support

Abstract

| | | |
|----|-----|----|
| × | 20 | 2 |
| 30 | 600 | 60 |
| 1 | 20 | 2 |

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

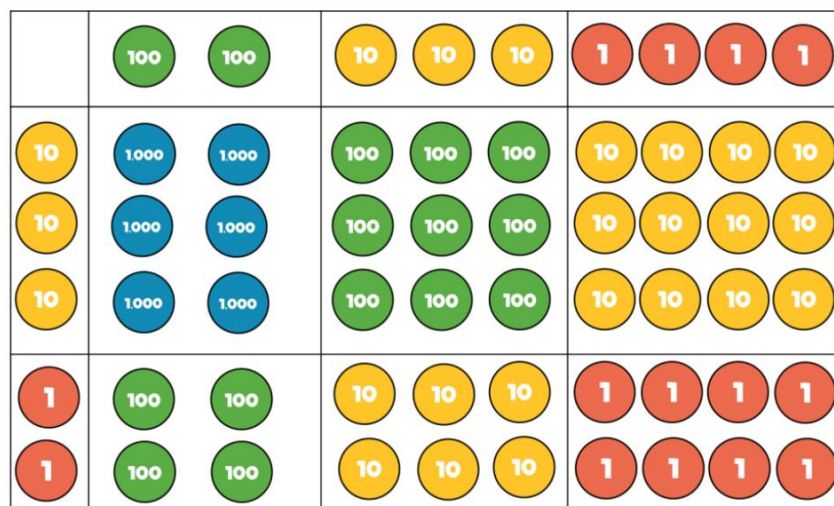
When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using.

This links to finding the area of a rectangle 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 method.

Multiplication Skill: Multiply 3-digit numbers by 2-digit numbers (Year 5)

Concrete & Pictorial



Optional Support

Abstract

| | | | |
|----|-------|-----|-----|
| × | 200 | 30 | 4 |
| 30 | 6,000 | 900 | 120 |
| 2 | 400 | 60 | 8 |

| | Th | H | T | O |
|-----|-----|---|---|---|
| | | 2 | 3 | 4 |
| × | | | 3 | 2 |
| | | 4 | 6 | 8 |
| 1 7 | 1 0 | 2 | 0 | |
| 7 | 4 | 8 | 8 | |

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.

Children are encouraged to move towards the formal written method, seeing the links with the grid method.

Multiplication Skill: Multiply 4-digit numbers by 2-digit numbers (Years 5-6)

Abstract

| TTh | Th | H | T | O |
|--------------|--------------|--------------|--------------|---|
| | 2 | 7 | 3 | 9 |
| × | | | 2 | 8 |
| <hr/> | | | | |
| 2 | 1 | 9 | 1 | 2 |
| ₂ | ₅ | ₃ | ₇ | |
| 5 | 4 | 7 | 8 | 0 |
| ₁ | | ₁ | | |
| <hr/> | | | | |
| 7 | 6 | 6 | 9 | 2 |

1

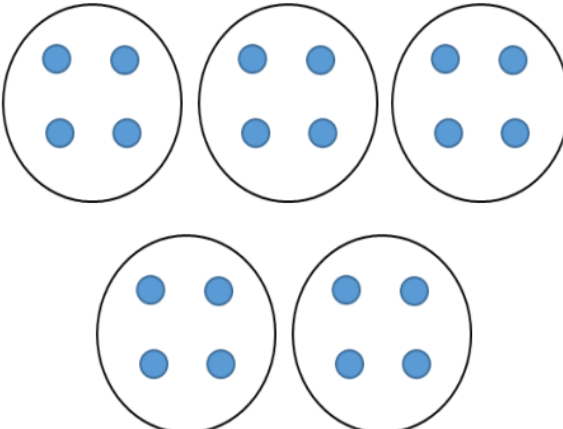
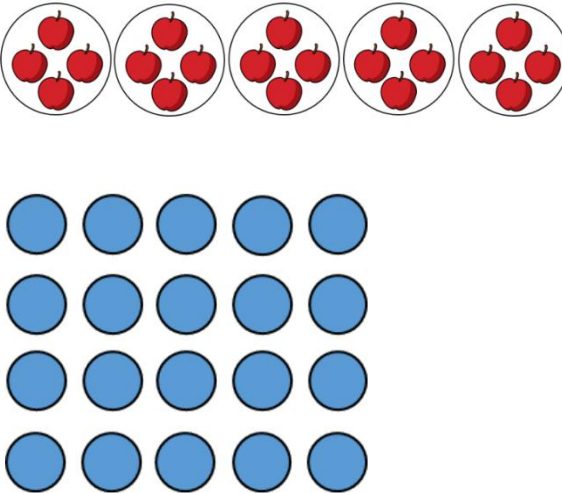
When multiplying 4-digits by 2-digits, children should be confident in the written method.

If children are still struggling with times tables, multiplication grids are provided to support when they are focusing on the use of the method.



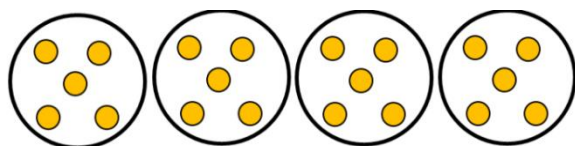
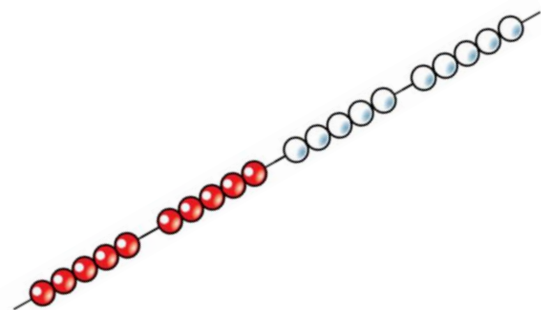
Division

Division Skill: Solve 1-step problems using multiplication (sharing) (Year 1-2)

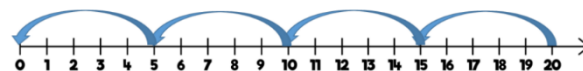
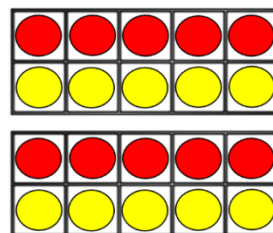
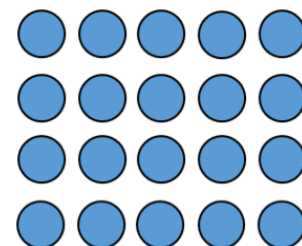
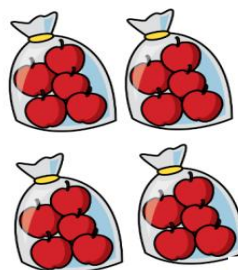
| Concrete | Pictorial | Abstract |
|--|---|---|
|  <p>Concrete representation of 20 items divided into 5 groups of 4.</p> |  <p>Pictorial representation of 20 items divided into 5 groups of 4. Includes a 4x5 grid of blue dots and a bar model with 5 boxes containing question marks.</p> | <p data-bbox="1478 343 2027 478">There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?</p> $20 \div 5 = 4$ <p data-bbox="1444 654 2016 829">Children solve problems by sharing amounts into equal groups.</p> <p data-bbox="1444 877 2027 1173">In Year 1, children use concrete and pictorial representations. They are not expected to record division formally.</p> <p data-bbox="1444 1228 1971 1396">In Year 2, children are introduced to the division symbol.</p> |

Division Skill: Solve 1-step problems using division (grouping) (Year 1-2)

Concrete



Pictorial



Abstract

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

$$20 \div 5 = 4$$

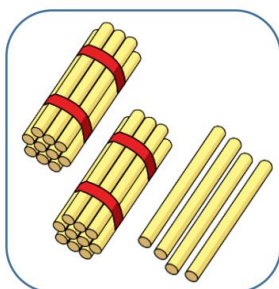
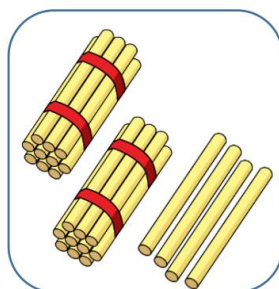
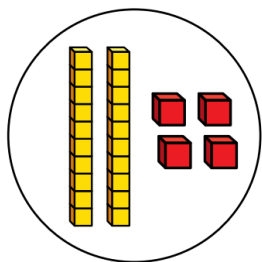
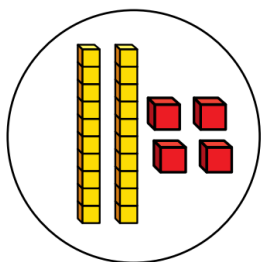
Children solve problems by grouping and counting the number of groups.

Grouping encourages children to count in multiples and links to repeated subtraction on a number line.

Children use concrete representations in fixed groups such as Numicon to help show the links between multiplication and division.

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

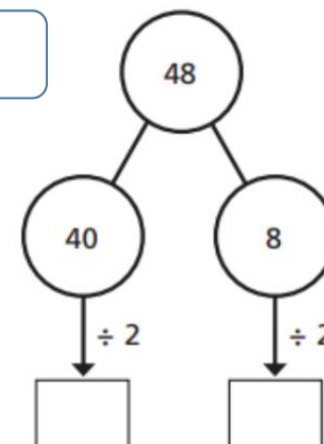
Concrete & Pictorial



| Tens | Ones |
|-------|---------|
| 10 10 | 1 1 1 1 |
| 10 10 | 1 1 1 1 |

Abstract

$$48 \div 2 = 24$$



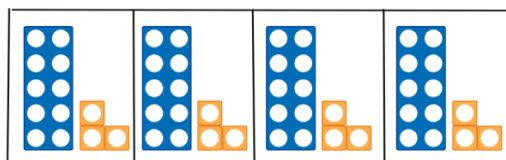
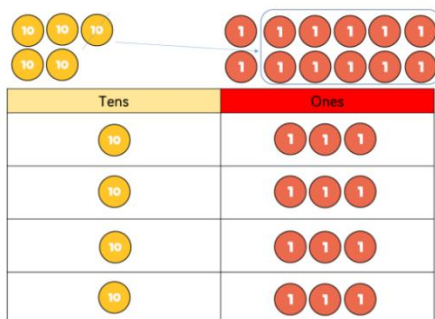
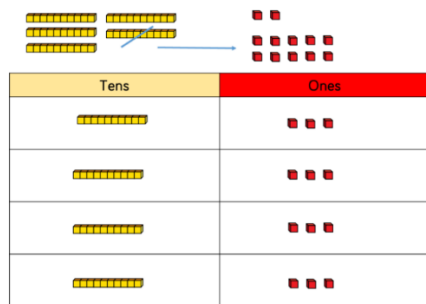
When dividing larger numbers, children use manipulatives that allow them to partition into tens and ones.

Straws, Base 10 and place value counters are used to share numbers into equal groups.

Part-whole models provide children with a clear written method that matches the concrete representation.

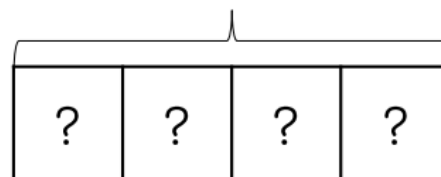
Division Skill: Divide 2-digits by 1-digit (sharing with exchange) (Year 3-4)

Concrete



Pictorial

52



Abstract

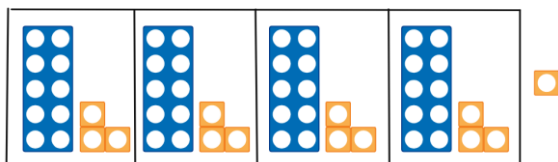
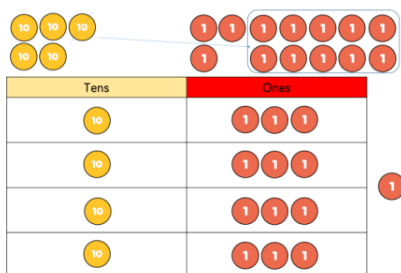
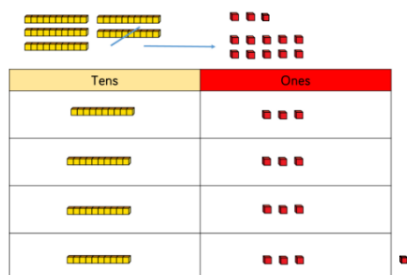
$$52 \div 4 = 13$$

When dividing numbers involving an exchange, children use Base 10 and place value counters to exchange one ten for ten ones.

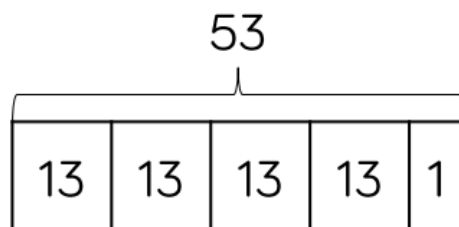
Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows.

Division Skill: Divide 2-digits by 1-digit (sharing with remainders) (Year 3-4)

Concrete



Pictorial



Abstract

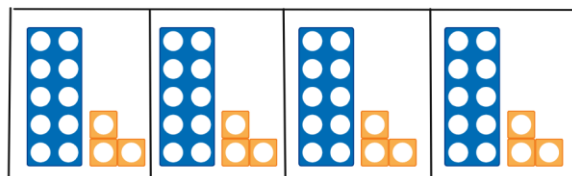
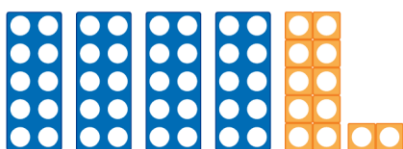
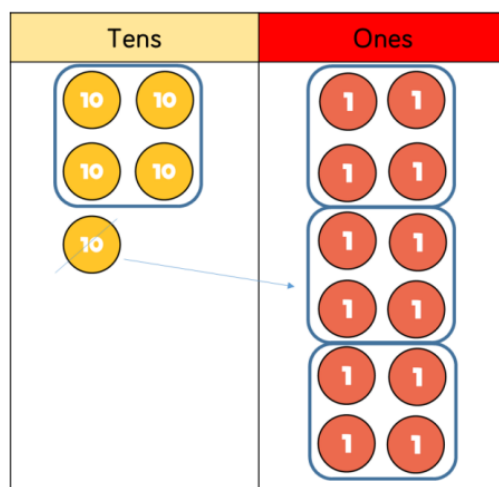
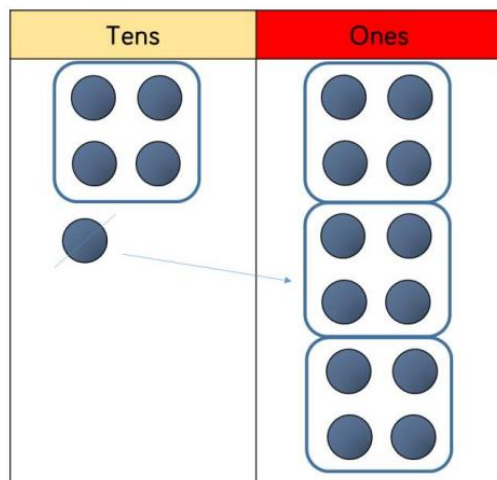
$$53 \div 4 = 13 \text{ r}1$$

When dividing numbers involving an exchange, children 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.

Division Skill: Divide 2-digits by 1-digit (grouping) (Year 3-4)

Concrete & Pictorial



Abstract

$$52 \div 4 = 13$$

| | | | | |
|--|---|---|---|---|
| | | 1 | 3 | |
| | 4 | 5 | | 2 |

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

| | | | | |
|--|---|---|---|----|
| | | 1 | 3 | r1 |
| | 4 | 5 | | 3 |

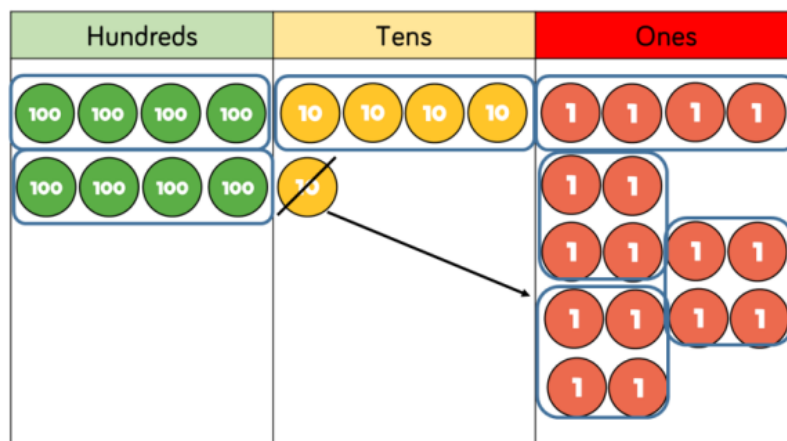
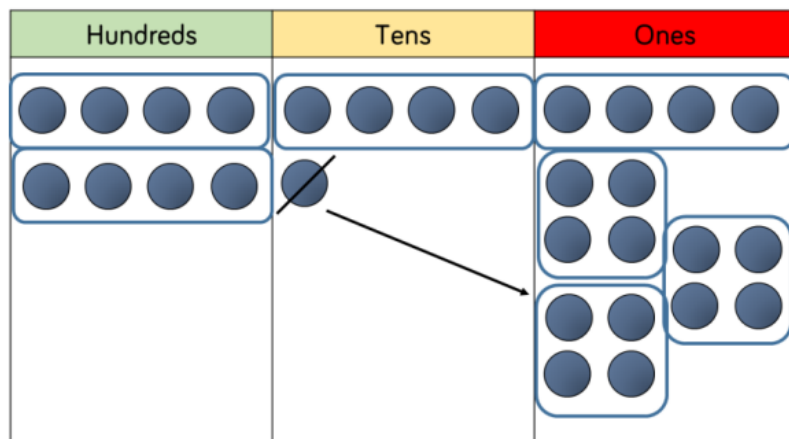
When using the short method, children use grouping. Starting with the largest place value, the group by the divisor.

Language is important here. Children consider 'How many groups of 4 tens can we make?' and 'How many groups of 4 ones can we make?'

Remainders can also be seen as they are left ungrouped.

Division Skill: Divide 3-digits by 1-digit (grouping) (Year 5)

Concrete & Pictorial



Abstract

$$856 \div 4 = 214$$

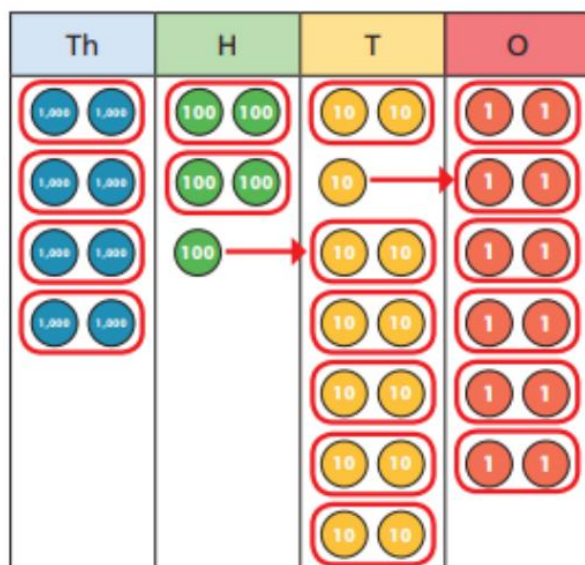
| | | | | |
|--|---|---|---|----|
| | | 2 | 1 | 4 |
| | 4 | 8 | 5 | 16 |

Children continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number.

Place value or plain counters support this understanding. Children can also draw their own counters and group them through a more pictorial method.

Division Skill: Divide 4-digits by 1-digit (grouping) (Year 5)

Concrete & Pictorial



Abstract

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

| | | | | |
|---|---|---|----------------|----------------|
| | 4 | 2 | 6 | 6 |
| 2 | 8 | 5 | ¹ 3 | ¹ 2 |

Counters can be used 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 are encouraged to move away from concrete and pictorial when dividing number with multiple exchanges.

Division Skill: Divide multi digits by 2-digits (short division) (Year 6)

Abstract

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

| | | | | |
|----|---|-------|--------|--------|
| | 0 | 4 | 8 | 9 |
| 15 | 7 | 7_3 | 13_3 | 13_5 |

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

When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective.

Children can write out multiples to support their calculations with larger remainders.

Children also solve problems with remainders where the quotient can be rounded as appropriate.

Division Skill: Divide multi digits by 2-digits (long division) (Year 6)

Abstract

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

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

- $1 \times 15 = 15$
- $2 \times 15 = 30$
- $3 \times 15 = 45$
- $4 \times 15 = 60$
- $5 \times 15 = 75$
- $10 \times 15 = 150$

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

When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction or decimal This depends on the context of the question.

Children also answer questions where the quotient needs to be rounded according to the context.

Multiplication and Division Vocabulary

Array: An ordered collection of counters, cubes or other items in rows and columns.

Commutative: Numbers can be multiplied in any order.

Dividend: In division, the number that is divided.

Divisor: In division, the number by which another is divided.

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

Factor: A number that multiplies with another to make a product.

Multiplicand: In multiplication, a number to be multiplied by another.

Partitioning: Splitting a number into its component parts.

Product: The result of multiplying one number by another.

Quotient: The result of a division.

Remainder: The amount left over after a division when the divisor is not a factor or a dividend.

Scaling: Enlarging or reducing a number by a given amount, called the scale factor.