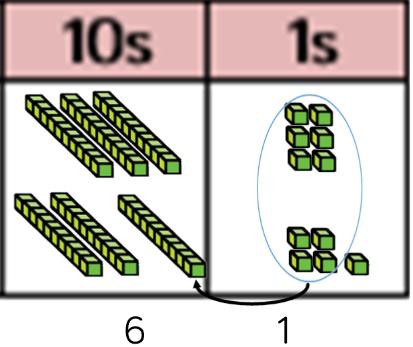
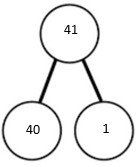
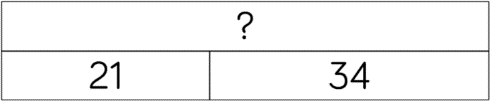
Calculation policy: Addition

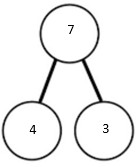
Key language: sum, total, parts and wholes, plus, add, altogether, more, ‘is equal to’ ‘is the same as’.

|  |  |  |
| --- | --- | --- |
| Concrete | Pictorial | Abstract |
| **Combining two parts to make a whole** (use other resources too e.g. eggs, shells, teddy bears, cars). | Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. | 4 + 3 = 7  Four is a part, 3 is a part and the whole is seven. |
| **Counting on using number lines** using cubes or Numicon. | A bar model which encourages the children to count on, rather than count all. | The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 |



|  |  |  |
| --- | --- | --- |
| **Regrouping to make 10;** using ten frames and counters/cubes or using Numicon.  6 + 5 | Children to draw the ten frame and counters/cubes. | Children to develop an understanding of equality e.g.  6 + □ = 11  6 + 5 = 5 + □  6 + 5 = □ + 4 |
| **TO + O using base 10**. Continue to develop understanding of partitioning and place value.  41 + 8 | Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. | 41 + 8  1 + 8 = 9  40 + 9 = 49 |
| **TO + TO using base 10.** Continue to develop understanding of partitioning and place value. 36 + 25 | Chidlren to represent the base 10 in a place value chart. | Looking for ways to make 10.  30 + 20 = 50  5 + 5 = 10  50 + 10 + 1 = 61  Formal method: |





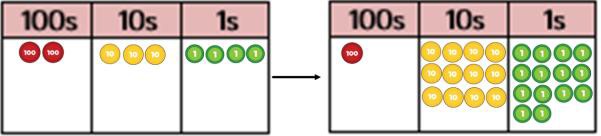
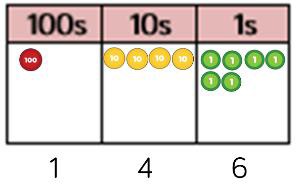
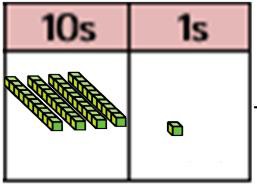
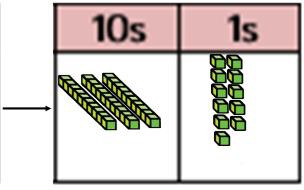
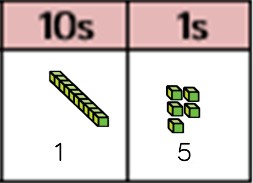
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Use of place value counters to add HTO + TO, HTO + HTO etc.** When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. | | | | Chidren to represent the counters in a place value chart, circling when they make an exchange. | |  |
| **Conceptual variation; different ways to ask children to solve 21 + 34** | | | | | | |
|  | ? |  | Word problems:  In year 3, there are 21 children and in year 4, there are 34 children.  How many children in total? | | **21 + 34 =**  = 21 + 34  Calculate the sum of twenty-one and thirty-four. |  |
| 21 |  | 34 | 21 + 34 = 55. Prove it | |  |
|  |  |  |  | | Missing digit problems: |
|  |  |  |  | |  |

CCaalclcuulalatitoionnppoolilcicyy: s: Subutbrtarcatciotinon

Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

|  |  |  |
| --- | --- | --- |
| Concrete | Pictorial | Abstract |
| **Physically taking away and removing objects from a whole** (ten frames, Numicon, cubes and other items such as beanbags could be used).  4 – 3 = 1 | Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. | **4- 3 =**  **= 4 – 3** |
| **Counting back** (using number lines or number tracks) children start with 6 and count back 2.  6 – 2 = 4 | Children to represent what they see pictorially e.g. | Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line |

|  |  |  |
| --- | --- | --- |
| **Finding the difference** (using cubes, Numicon or Cuisenaire rods, other objects can also be used).  Calculate the difference between 8 and 5. | Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. | Find the difference between 8 and 5. 8 – 5, the difference is  Children to explore why  9 - 6 = 8 – 5 = 7 – 4 have the same difference. |
| **Making 10** using ten frames. 14 – 5 | Children to present the ten frame pictorially and discuss what they did to make 10. | Children to show how they can make 10 by partitioning the subtrahend.    14 – 4 = 10  10 – 1 = 9 |
| **Column method** using base 10. 48-7 | Children to represent the base 10 pictorially. | Column method or children could count back 7. |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Column method** using base 10 and having to exchange. 41 – 26 | | Represent the base 10 pictorially, remembering to show the exchange. | | Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11. |
| **Column method** using place value counters. 234 – 88 | | Represent the place value counters pictorially; remembering to show what has been exchanged. | | Formal colum method. Children must understand what has happened when they have crossed out digits. |
| **Conceptual variation; different ways to ask children to solve 391 - 186** | | | | |
|  | Raj spent £391, Timmy spent £186. How much more did Raj spend?  Calculate the difference between 391 and 186. | | = 391 – 186    What is 186 less than 391? | Missing digit calculations |

Calculation policy: Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

|  |  |  |
| --- | --- | --- |
| Concrete | Pictorial | Abstract |
| **Repeated grouping/repeated addition** 3 × 4  4 + 4 + 4  There are 3 equal groups, with 4 in each group. | Children to represent the practical resources in a picture and use a bar model. | 3 × 4 = 12  4 + 4 + 4 = 12 |
| **Number lines to show repeated groups-** 3 × 4    Cuisenaire rods can be used too. | Represent this pictorially alongside a number line e.g.: | Abstract number line showing three jumps of four.  3 × 4 = 12 |

|  |  |  |
| --- | --- | --- |
| **Use arrays to illustrate commutativity** counters and other objects can also be used.  2 × 5 = 5 × 2 | Children to represent the arrays pictorially. | Children to be able to use an array to write a range of calculations e.g.  10 = 2 × 5  5 × 2 = 10  2 + 2 + 2 + 2 + 2 = 10  10 = 5 + 5 |
| **Partition to multiply** using Numicon, base 10 or Cuisenaire rods.  4 × 15 | Children to represent the concrete manipulatives pictorially. | Children to be encouraged to show the steps they have taken.    A number line can also be used |
| **Formal column method** with place value counters (base 10 can also be used.) 3 × 23 | Children to represent the counters pictorially. | Children to record what it is they are doing to show understanding.  3 × 23 3 × 20 = 60  3 × 3 = 9  20 3 60 + 9 = 69 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Formal column method** with place value counters. 6 x 23 | | Children to represent the counters/base 10, pictorially  e.g. the image below. | | Formal written method |
| When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract:  To get 744 children have solved 6 × 124.  To get 2480 they have solved 20 × 124. | | | |  |
| **Conceptual variation; different ways to ask children to solve 6 × 23** | | | | |
|  | Mai had to swim 23 lengths, 6 times a week.  How many lengths did she swim in one week?  With the counters, prove that 6 x 23  = 138 | | Find the product of 6 and 23 6 × 23 =  = 6 × 23 | What is the calculation? What is the product? |

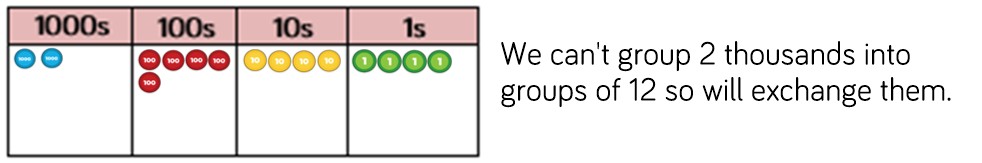
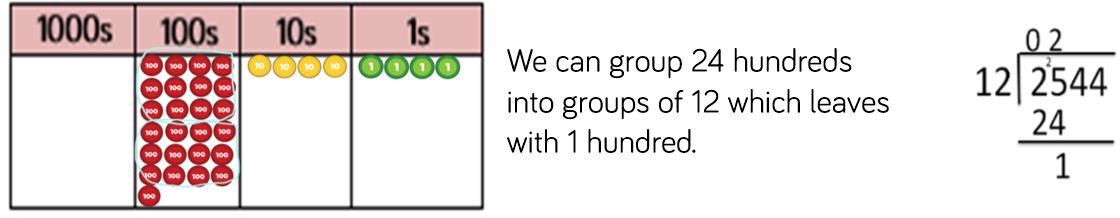
Calculation policy: subtraction

Key language: share, group, divide, divided by, half.

Calculation policy: Division

|  |  |  |
| --- | --- | --- |
| Concrete | Pictorial | Abstract |
| **Sharing** using a range of objects. 6 ÷ 2 | Represent the sharing pictorially. | 6 ÷ 2 = 3    Children should also be encouraged to use their 2 times tables facts. |
| **Repeated subtraction** using Cuisenaire rods above a ruler. 6 ÷ 2 | Children to represent repeated subtraction pictorially. | Abstract number line to represent the equal groups that have been subtracted. |

|  |  |  |
| --- | --- | --- |
| **2d ÷ 1d with remainders** using lollipop sticks. Cuisenaire rods, above a ruler can also be used.  13 ÷ 4  Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.    There are 3 whole squares, with 1 left over. | Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over. | 13 ÷ 4 – 3 remainder 1  Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line.  ‘3 groups of 4, with 1 left over’ |
| **Sharing using place value counters.** | Children to represent the place value counters | Children to be able to make sense of the |
| 42 ÷ 3 = 14 | pictorially. | place value counters and write calculations to |
|  |  | show the process. |
|  |  | 42 ÷ 3  42 = 30 + 12  30 ÷ 3 = 10  12 ÷ 3 = 4  10 + 4 = 14 |



|  |  |  |
| --- | --- | --- |
| **Short division** using place value counters to group. 615 ÷ 5     1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones? | Represent the place value counters pictorially. | Children to the calculation using the short division scaffold. |
| **Long division** using place value counters 2544 ÷ 12 | | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | | | |
| **Conceptual variation; different ways to ask children to solve 615 ÷ 5** | | | |
| Using the part whole model below, how can you divide 615 by 5 without using short division? | I have £615 and share it equally between 5 bank accounts. How much will be in each account?  615 pupils need to be put into 5 groups. How many will be in each group? | 615 ÷ 5 =  = 615 ÷ 5 | What is the calculation? What is the answer? |

|  |  |
| --- | --- |
| **Pre-counting Experiences** | |
| Sorting objects into sets and categorisation | Categorisation – at the heart of language development |
| Developing the notion of objects being separated off from those that you are not counting. |
| Early experience of forming equivalence. |
| Rich experience of talk | Using language such as ‘one more’ and ‘another one’. |
| Distinguishing between small numbers such as one, two and three | Beginning to learn that numbers are used to describe sets of objects |
| To distinguish between sets of different sizes |

|  |  |  |
| --- | --- | --- |
| **Counting Skills/Concepts** | | |
| 1. | The order of numbers is invariant | When you are counting 3 always comes after 2. |
| 2. | One–to-one matching | Saying each number as finger touches object |
| 3. | Connecting cardinal and ordinal aspects | The last number you get to when counting the set is the number of objects in the set.  e.g 1,2,3,4,5 There are 5 objects. |
| 4. | Counting as an abstraction | The numbers can refer to anything you are counting. |
| 5. | The order and arrangements of objects is irrelevant | Whatever order or arrangement you count the things – there are always the same amount. |
| 6. | Matching the names to the numerals | Establishing the connection between each name and numeral.  1(one) 2 (two) 3 (three) etc |
| 7. | Connecting ‘one more’ and the ‘next number’. | The next number after any given number is always one more. |