



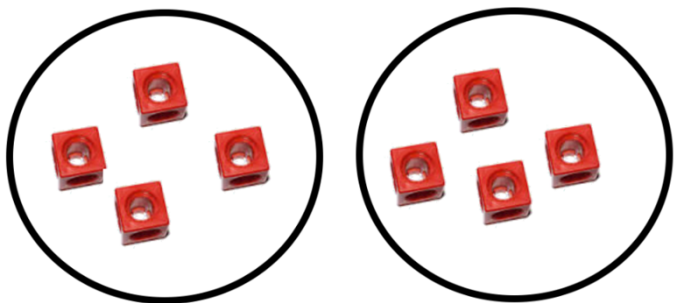
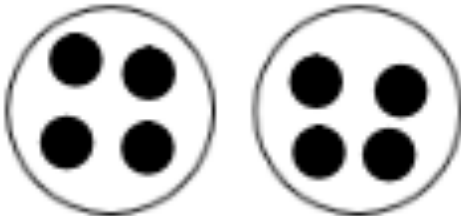
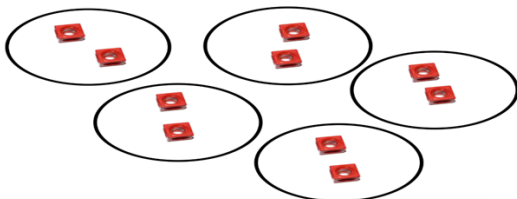

**Northway Primary School**  
**Mathematics Calculation Policy - Division**

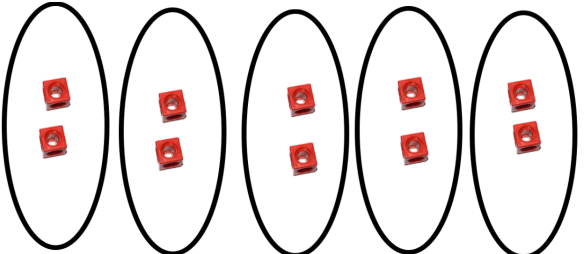
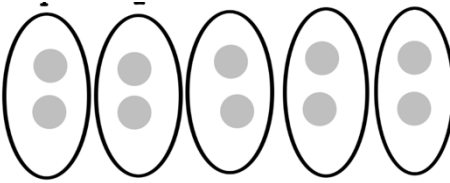
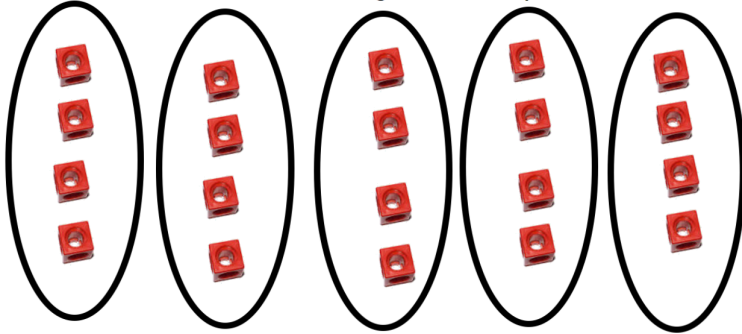
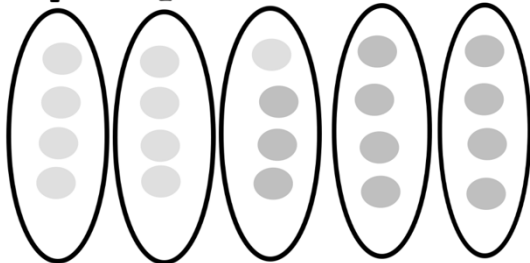
The **Concrete Pictorial Abstract (CPA)** approach is a system of learning that uses physical and visual aids to build a child's understanding of abstract topics.

- **Concrete:** New concepts are introduced through the use of physical objects or practical equipment e.g. Numicon or Base 10. These can be physically handled, enabling children to explore different mathematical concepts.
- **Pictorial:** Once children are confident with a concept using concrete resources, they progress to drawing pictorial representations of the objects. This stage encourages children to make a mental connection between the physical object and abstract levels.
- **Abstract:** Once children have a secure understanding of the concept through the use of concrete resources and visual images, they are then able to move on to the abstract stage. Here, children are using abstract symbols to model problems - usually numerals. To be able to access this stage effectively, children need access to the previous two stages alongside it.

For the most effective learning to take place, children need to constantly go back and forth between each of the stages. This ensures concepts are reinforced and understood.

**Children should be using concrete resources when covering place value objectives in Maths lessons and making numbers with these so that they learn the value of each concrete resource. This will then support them when using the same concrete resources for division methods (see below).**

| Year group | NC Objective  | Concrete   | Pictorial   | Abstract  |
|------------|---|--|---|---|
|            | Pupils should be taught to:   |  |   |   |
| Reception  | <p><u>Development Matters:</u></p> <p>Automatically recall some number bonds to 10, including double facts</p> <p>Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</p> | <p><b>Annie has 8 apples. She shares them into 2 baskets. How many apples are there in each basket?</b></p>        |    | <p><b>4 apples in each basket</b></p> <p>Reception do not cover the abstract of this - they explore division in terms of sharing and grouping, but do not use the mathematical symbol for division.</p>             |
| Y1         | <p>Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</p>   | <p><b>Annie has 10 apples. She shares them into five baskets. How many apples are there in each basket?</b></p>  |  | <p><b>2 apples in each basket.</b></p> <p>Y1 do not cover the abstract of this - they explore division in terms of sharing and grouping, but are not expected (according to the National Curriculum) to use the</p> |

|           |   |  |  |  |
|-----------|---|--|--|--|
|           |   | <p>Children will begin to use arrays, with the support of the teacher when they are ready:</p>  | <p>Children will begin to use arrays, with the support of the teacher when they are ready:</p>  | <p>mathematical symbol for division.</p> |
| <p>Y2</p> | <p>Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs</p> <p>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p> |   |   | <p><math>20 \div 5 = 4</math></p>        |

Y3

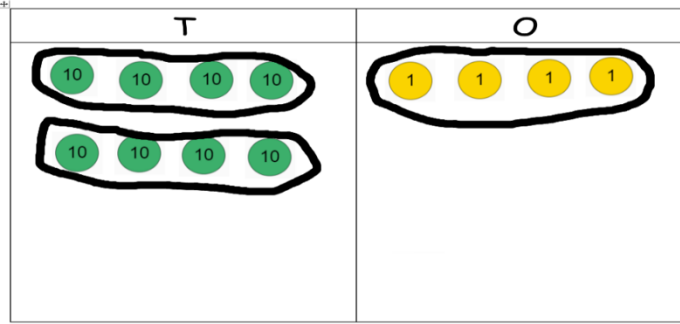
Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

**Step 1**

**Dividing by grouping (into 'lots of the divisor') - 2 digits by 1 digit with NO REGROUPING**

How many groups of 4 can be made out of the eight tens? (2)

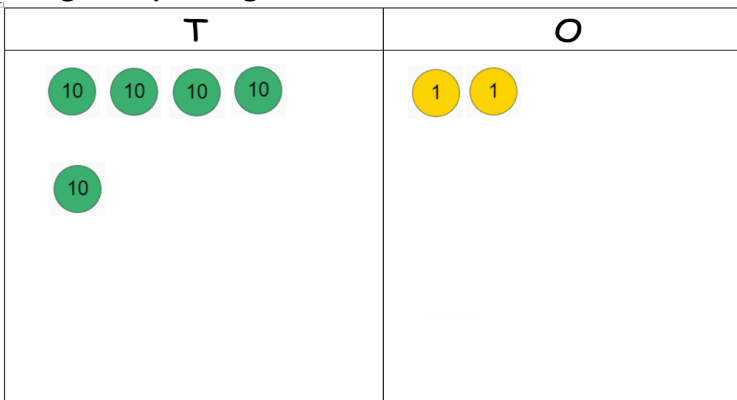
How many groups of 4 can be made out of the 4 ones? (1)



This will only be an initial step before quickly moving on to step 2.

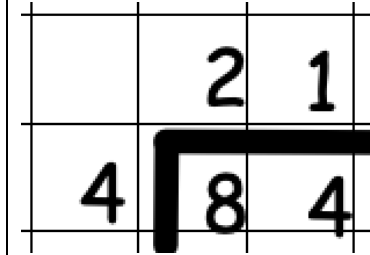
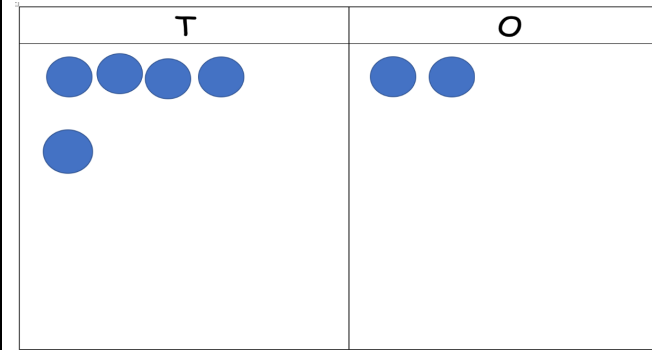
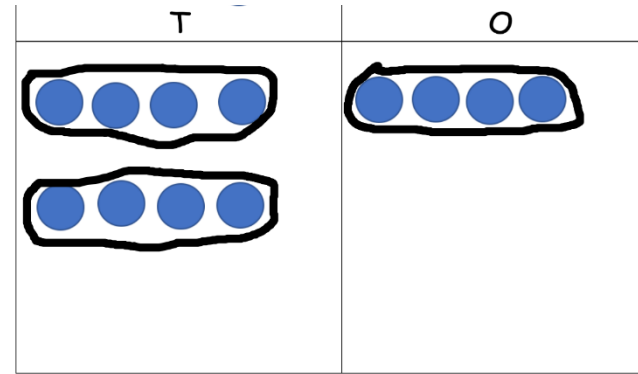
**Step 2**

**Dividing by grouping (into 'lots of the divisor') - 2 digit by 1 digit WITH REGROUPING**

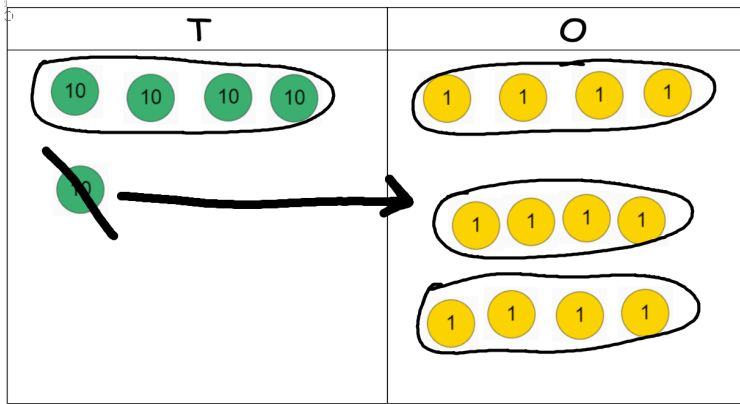


How many groups of 4 can be made out of the eight tens? (2)

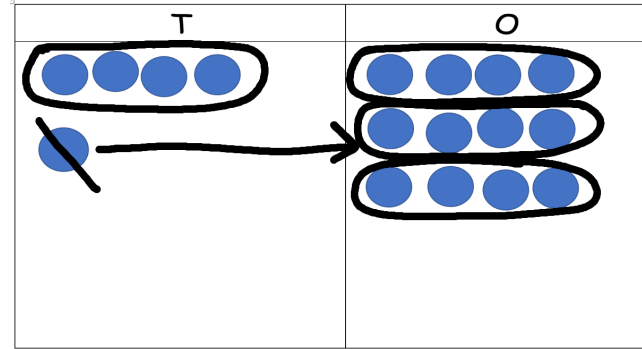
How many groups of 4 can be made out of the 4 ones? (1)



The 'ten' left over cannot be grouped into a four, so is regrouped for ten 'ones' and then grouped, as well as the two ones from the original number.



The 'ten' left over cannot be grouped into a four, so is regrouped for ten 'ones' and then grouped, as well as the two ones from the original number.



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

Y4

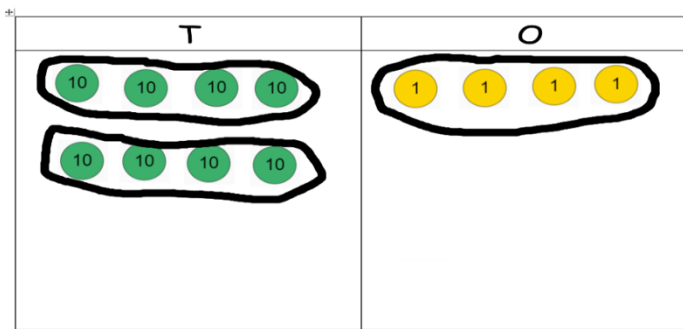
solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

**Step 1**

**Dividing by grouping (into 'lots of the divisor') - 2 digits by 1 digit with NO REGROUPING**

How many groups of 4 can be made out of the eight tens? (2)

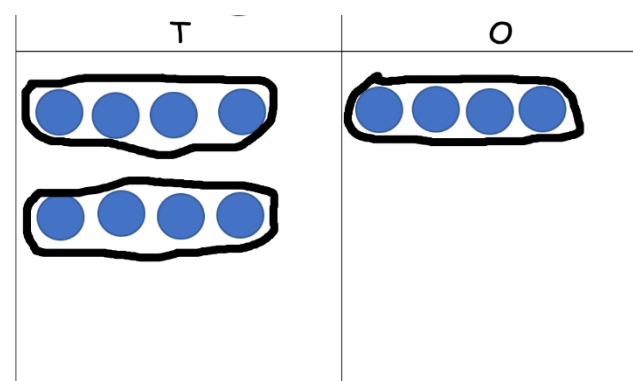
How many groups of 4 can be made out of the 4 ones? (1)



This will only be an initial step before quickly moving on to step 2 (within same lesson).

How many groups of 4 can be made out of the eight tens? (2)

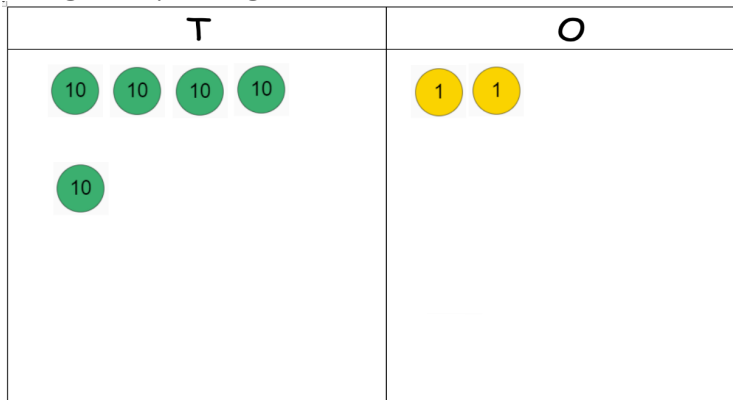
How many groups of 4 can be made out of the 4 ones? (1)



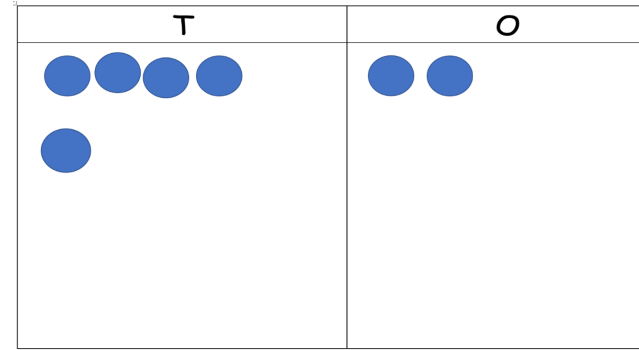
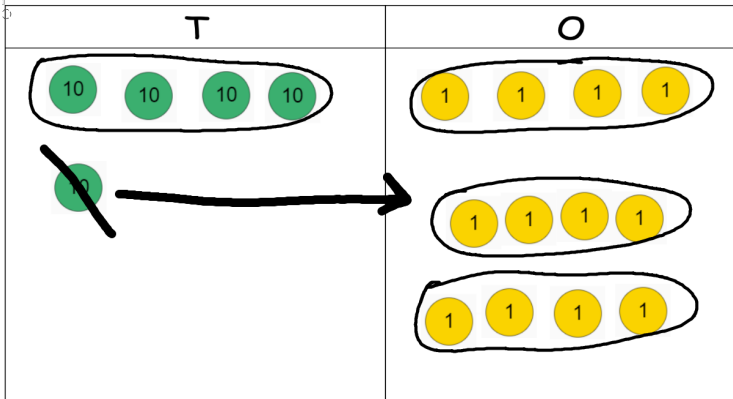
|   |   |   |
|---|---|---|
|   | 2 | 1 |
| 4 | 8 | 4 |

## Step 2

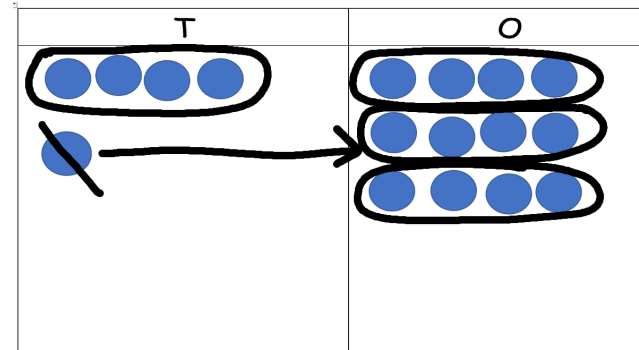
Dividing by grouping (into 'lots of the divisor') -  
2 digits by 1 digit WITH REGROUPING



The 'ten' left over cannot be grouped into a four, so is regrouped for ten 'ones' and then grouped, as well as the two ones from the original number.



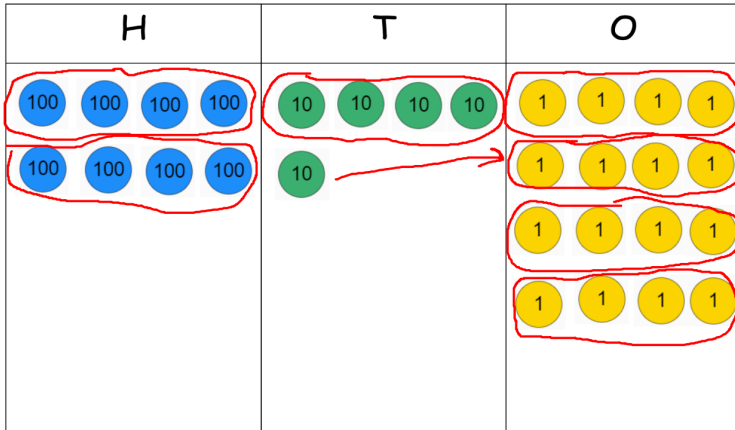
The 'ten' left over cannot be grouped into a four, so is regrouped for ten 'ones' and then grouped, as well as the two ones from the original number.



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

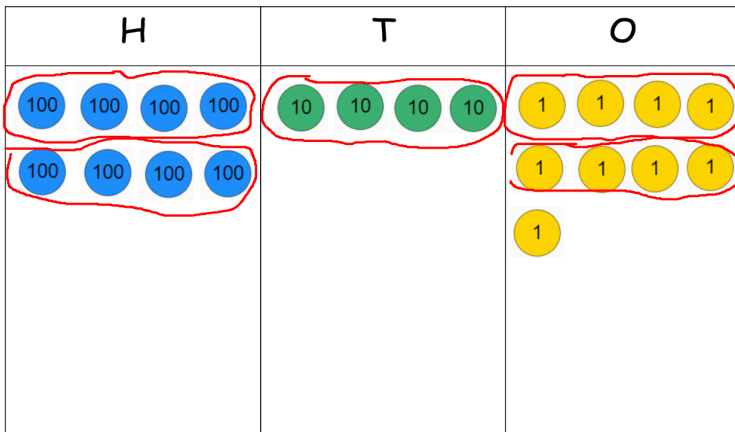
**Step 3**

**3 digits by 1 digit - one lot of regrouping**

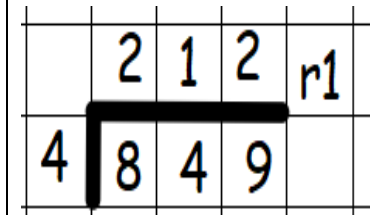
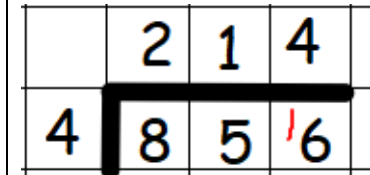
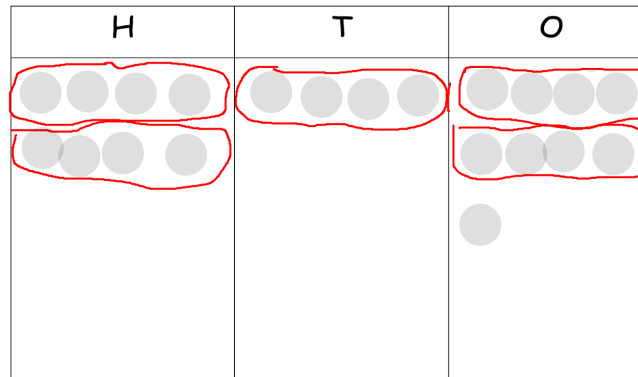
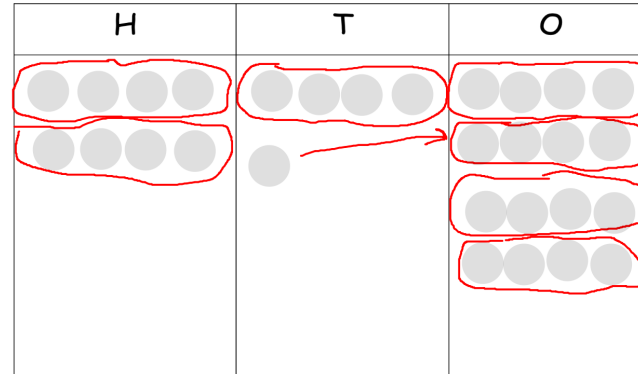


SEE ABOVE FOR THE DETAILED STEPS TO REACH THIS ANSWER.

**Remainders**



Any **ONES** left over that cannot be put into a complete group of 4 are recorded as a remainder.



Y5

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

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

|   |   |   |   |   |    |
|---|---|---|---|---|----|
|   | 1 | 4 | 1 | 2 | r1 |
| 3 | 4 | 2 | 3 | 7 |    |

Y6

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context

Divide numbers up to 4 digits by a two-digit number using the formal written method

**Short division by 2-digit numbers 12 and under:**

|   |   |   |   |   |    |
|---|---|---|---|---|----|
|   |   | 3 | 2 | 2 | r3 |
| 1 | 2 | 3 | 8 | 6 | 7  |

Answer can also be written as a fraction:

|   |   |    |   |   |   |
|---|---|----|---|---|---|
|   |   | 3  | 2 | 2 | 3 |
|   |   | 12 |   |   |   |
| 1 | 2 | 3  | 8 | 6 | 7 |

Remainder can also be written as a simplified fraction:

|   |   |   |   |   |   |
|---|---|---|---|---|---|
|   |   | 3 | 2 | 2 | 1 |
|   |   | 3 | 8 | 6 | 4 |
| 1 | 2 | 3 | 8 | 6 | 7 |



of short division where appropriate, interpreting remainders according to the context

Include decimal numbers e.g.:

$$\begin{array}{r} 4.02 \\ 8 \overline{) 32.16} \end{array}$$

Long division for numbers over 12, using multiples lists as a support.

|  |  |  |  |  |  |  |      |      |
|--|--|--|--|--|--|--|------|------|
|  |  |  |  |  |  |  | x1   | 17   |
|  |  |  |  |  |  |  | x10  | 170  |
|  |  |  |  |  |  |  | x2   | 34   |
|  |  |  |  |  |  |  | x20  | 340  |
|  |  |  |  |  |  |  | x5   | 85   |
|  |  |  |  |  |  |  | x50  | 850  |
|  |  |  |  |  |  |  | x100 | 1700 |

  
$$\begin{array}{r} 102 \\ 17 \overline{) 1734} \\ -1700 \\ \hline 34 \\ -34 \\ \hline 00 \end{array}$$

(100 x 17)  
(2 x 17)

Children can add to the list of multiples to try and get as close to the dividend as they can, taking away the biggest chunk possible first. The chunk they are subtracting must come first inside the bracket each time so they don't make errors here. Circle the chunks they have taken away and then add them together to get the answer.

