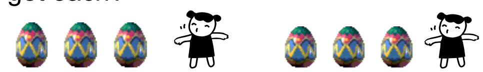
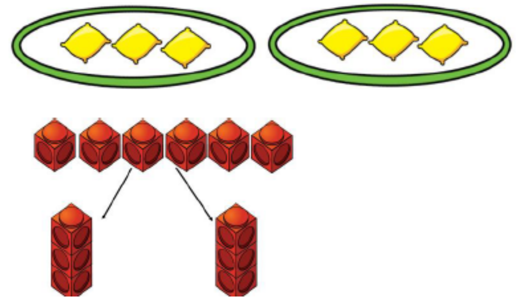
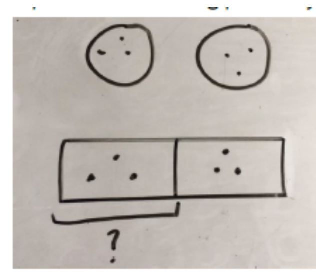
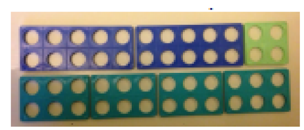
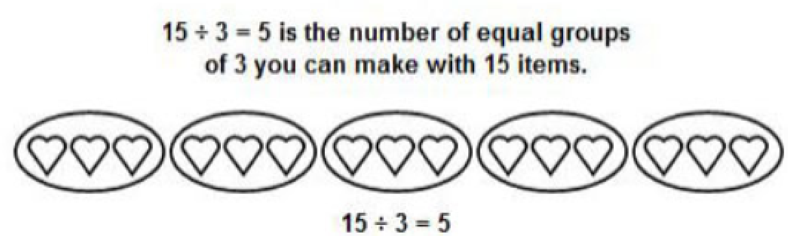
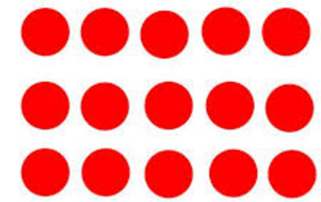
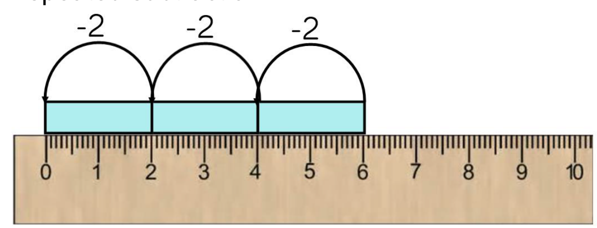
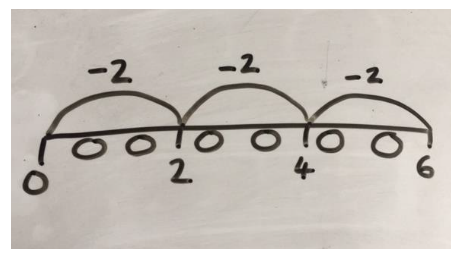
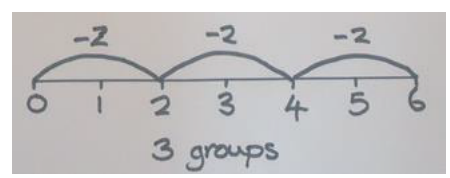
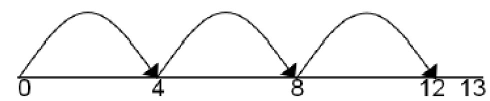
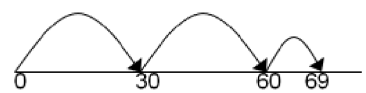
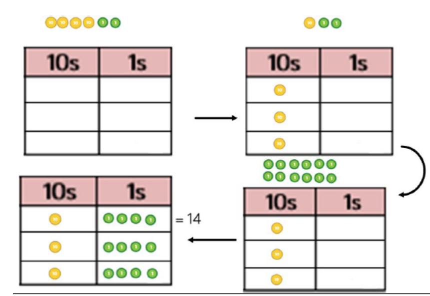
Headlands Primary School

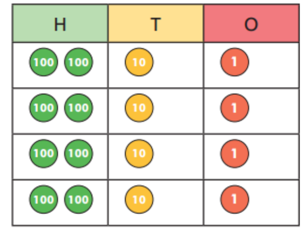
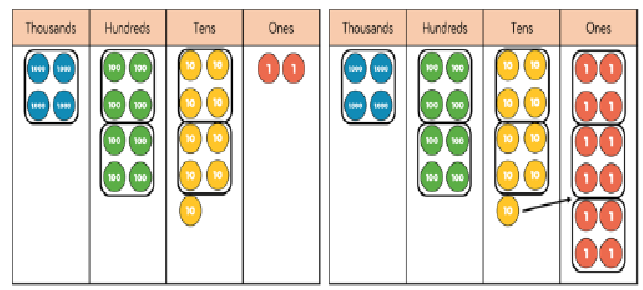
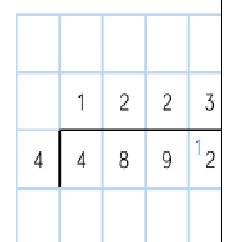
Division Policy and Methods

	Multiplication & division facts/ **Mental Calculations**	**Calculation**	**Methods**
E Y F S		Count reliably with numbers from one to 20. Solve problems, including halving and sharing. Solve practical problems that involve sharing into equal groups.	**Sharing & Grouping** Children use objects and pictures to support **division.** 6 Easter eggs are shared between 2 children. How many eggs do they get each?  (sharing into sets) There are 6 Easter eggs. How many children can have two each?  (grouping into groups)

Y e a r 1	Recall and use division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers. Recognise, find and name a half as one of two equal parts and a quarter as one of four equal parts of an object shape or quantity.	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.	Sharing objects into groups   24 divided into groups (chunks) of 6. There are 4 groups of 6 in 24  Division as grouping e.g. I have 15 sweets and put them in groups of 3, how many groups? 

Y e a r 2	Recall and use division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.	Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs Solve problems involving ***division***, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	Division within arrays- linking to multiplication  3 x 5 = 15 15 ÷ 5 = 3 Repeated subtraction  3 groups of 2  

Year 3	Recall and use multiplication and division facts for the **3, 4 and 8** multiplication tables 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	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 Solve problems, ***including missing number problems***, ***involving multiplication and division***, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	**Children continue using a number line (see Year 2 – repeated subtraction or addition),** counting on in larger **"chunks". including calculations that leave remainders.** Use counters to support children's understanding. Step 1: 1 digit answers 13 ÷ 4 = 3 r 1  Step 2: 2 digit answers 69 ÷ 3 = 23  Use **place value** counters to develop children's understanding of **short division:** Grouping and sharing methods using place value counters is also encouraged. Sharing using place value counters. 42 ÷ 3 = 14  Begin to look at ***short division with no remainders*** in the final answer when children have had experience with and demonstrated understanding of grouping for division. $\begin{array}{r} 24 \\ 4\overline{)96} \end{array}$
Year 4	Recall multiplication and division facts for multiplication tables **up to 12 × 12** Use place value, known and derived facts to multiply and divide mentally,	Solve problems involving ***multiplying and dividing***, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence	**Written algorithm & Representing division** Use **short division** with no remainders in the final answer, using place value counters to support.

	including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers Recognise and use factor pairs and commutativity in mental calculations	problems such as n objects are connected to m objects.	Jack is working out 844 ÷ 4 using a place value chart.  $\begin{array}{r\|l} & 24 \\ \hline 4 & 96 \end{array}$
Year 5	Multiply and divide numbers mentally drawing upon known facts. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	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 Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	<u>**Formal written methods**</u> **Short Division ('bus stop' method):** Introduce method using place value counters to explain exchanging:   $3\overline{)2\,9\,{}^{2}1}$ with 9 7 above Short division with ***remainders***:

<table>
<tr>
<td>Y
e
a
r
6</td>
<td>Perform mental calculations, including with mixed operations and large numbers

Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.2) for a simple fraction (e.g. 1/5)</td>
<td>Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context 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

Use written division methods in cases where the answer has up to two decimal places.</td>
<td>
$$\begin{array}{r} 1\ 6\ r3 \\ 5\overline{)8\ {}^{3}3} \end{array}$$

Use place value counters to support changing remainders to decimals, exchange remainders for counters of the next column.

…leading to short division for decimals:
57 ÷ 2 =
$$\begin{array}{r} \mathbf{28.\ 5} \\ \mathbf{2|\ \overline{57.{}^{1}0}} \end{array}$$

Use long division with chunking (HTU by TU). This shows where mistakes are made so may be preferable to short division when dividing by 2 digit numbers.
<table>
<tr><td></td><td></td><td>0</td><td>3</td><td>6</td><td></td></tr>
<tr><td>1</td><td>2</td><td>4</td><td>3</td><td>2</td><td>(×30)</td></tr>
<tr><td></td><td>−</td><td>3</td><td>6</td><td>0</td><td></td></tr>
<tr><td></td><td></td><td></td><td>7</td><td>2</td><td>(×6)</td></tr>
<tr><td></td><td>−</td><td></td><td>7</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td></td></tr>
</table>
<u>Multiples of 12:</u>
12 × 1 = 12
12 × 2 = 24
12 × 3 = 36
12 × 4 = 48
12 × 5 = 60
12 × 6 = 72
12 × 7 = 84
12 × 8 = 96
12 × 7 = 108
12 × 10 = 120

Where an answer leaves a remainder, children should be able to convert the remainder to a fraction or decimal (depending on the questions).</td>
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			432 ÷ 15 becomes $\begin{array}{rrl} & 28 & \\ 15 & \overline{)432} & \\ & 300 & 15\times20 \\ \hline & 132 & \\ & 120 & 15\times8 \\ \hline & 12 & \end{array}$ $\frac{\cancel{12}}{\cancel{15}} = \frac{4}{5}$ Answer: $28\frac{4}{5}$

<u>Glossary:</u>

Commutativity: can be done in any order: 3 x 5 = 5 x 3. Multiplication and addition are commutative. Subtraction and division are not.

Scaling: increasing a number by a scale factor:
A scaling model is also used to compare two numbers or amounts involving phrases such as ‘so many times as much (or as many)’

Correspondence: If you know a fact for one object, this can be used to find further facts, e.g. 1 sandwich costs £2, so 4 sandwiches cost £8

Associativity: The property that if the same operation is applied to the same numbers, the answer will be the same.
Addition is associative, e.g. $1 + (2 + 3) = (1 + 2) + 3$.
Multiplication is associative, e.g. $1 \times (2 \times 3) = (1 \times 2) \times 3$.
Subtraction and division are not associative because, as counter examples, $1 – (2 – 3) \neq (1 – 2) – 3$ and $1 \div (2 \div 3) \neq (1 \div 2) \div 3$.
We can use the associative law to help with multiplication calculations. For example: Find 5×26: Factorise 26 as 13×2, so we now have $13 \times 2 \times 5$. Use the associative law to associate the 2 with the five, rather than with the 13 in order to make the calculation easier. $(13 \times 2) \times 5 = 13 \times (2 \times 5) = 13 \times 10 = 130$.

Distributive law: The property that you will get the same answer with when you:
multiply a number by a group of numbers added together, or do each multiplication separately then add them, eg $3 \times (2 + 4)$ is the same as $(3 \times 2) + (3 \times 4)$